MARINE REVIEW

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SHIPPING STATISTICS.

A SUMMARY OF THE ANNUAL REPORT OF THE COMMISSIONER OF NAVIGATION BEARS OUT ALL THAT HAS BEEN SAID IN THESE COLUMNS OF LATE REGARDING THE CONSTRUCTION OF SHIPS FOR HOME TRADE.

Mr. E. T. Chamberlain, United States commissioner of navigation, has given out a short summary of the statistical part of his annual report. It bears out all that has been said in these columns of late regarding the activity that prevails in our ship yards in the building of vessels for home trade. The year just beginning (treasury department year) will show far greater activity than the year that ended on Friday last. Full reports will not be received by the bureau of navigation for several weeks, the commissioner says, but returns already received warrant these statements:

The total output of American ship yards has been the largest of any year for the last quarter of a century, except 1891, when 1,384 vessels of 369,302 gross tons were built and documented in the United States. During the past fiscal year the construction of merchant vessels, officially returned, has consisted of 1,429 vessels of 320,876 gross tons. Besides these twenty-two vessels of foreign construction, aggregating 30,181 tons, have been admitted to American registry, of which ten were prizes captured during the war with Spain, four were steamships, aggregating 12,126 tons, admitted by special acts of congress, and the remainder wrecked vessels, repaired in American ship yards. It is also reported from Manila that since last August, 141 vessels have been transferred from the hands of Spanish, German and British subjects to Americans, indicating the confidence of the business men of Manila in American government. The tonnage of these vessels has not yet been reported, and the transfer does not carry with it all the rights of American registry. Had the senate passed the house bill for the registry of Hawaiian vessels, the total additions to our merchant fleet during the year would have reached nearly 400,000 tons. Our largest annual production was in 1855 when 2,027 vessels of 583,450 tons were built and documented.

During 1898 Great Britain built 1,549 vessels of 1,390,116 tons. The difference in the kind of vessels built is roughly disclosed by the average size, our construction averaging only about 225 tons, while the British averages 900 tons. Nearly all of our new tonnage is built to navigate in the coasting trade reserved to American vessels. The only steamships built directly for the foreign trade were the Havana and Mexico of the New York and Cuba mail and the four Admiral steamships for Cuba and Jamaica, aggregating 19,750 tons, which were built under the postal subsidy act. In anticipation of legislation at the coming session, however, construction has begun or been contracted for on about 100,000 tons of steel steamships for foreign trade and trade with Hawaii and Porto Rico, involving an expenditure of about $15,000,000.

For the first time in our history on June 30 the total tonnage of our steam vessels, when tabulated, will exceed the total of all other kinds of documented vessels. During the year, however, 460 sail vessels of 96,458 tons have been built, compared with 426 of 42,502 tons for the previous year, while the steam vessels built number 478 of 167,851 tons, compared with 448 of 110,128 for the previous year. In certain trades our large sailing vessels endeavor to compete with foreign cargo steamships, and will doubtless continue to do so, at all events until the construction of the Nicaragua canal.

The most notable vessel is doubtless the John Smeaton, a steel barge of 5,049 gross tons, built at West Superior, Wis., probably the largest fore-and-aft vessel ever built. The largest seagoing sailing vessel built in Europe in 1898 was the Ernest Siegfried of Havre, 3,214 tons.

For the first time in our history, steel has become the principal material in our annual construction of rigged vessels, the steel tonnage for the year being 133,991 tons, wood 130,309 tons. Iron has ceased to be a ship building material, only one vessel of 9 tons having been built of iron. During 1898 in Great Britain 99 per cent, or practically the whole construction except small fishing vessels, was of steel.

The additions to our seagoing fleet, including 30,181 tons foreign-built, referred to, were 166 vessels of 155,987 tons, divided into fifty steam vessels of 75,289 tons, seventy-four schooners of 62,906 tons, ten square-rigged vessels of 12,428 tons, and thirty-two yachts of 5,364 tons, including the new cup defender. The square rigged vessels are mainly for the foreign trade, and the schooners for coasting purposes or the trade with the British provinces and the West Indies.

There were built 491 unrigged vessels, barges, and canal boats for Canadian or interstate trade, aggregating 56,567 tons. Excluding these, the greatest increase has been on the Atlantic coast, the tonnage of rigged vessels built rising from 51,136 tons in 1898 to 134,352 tons for the past year, while on the Pacific there has been a decrease from 44,896 tons to 32,412 tons. The output of rigged vessels on the Great Lakes was 81,390 tons, compared with 45,211 during the fiscal year 1898.

Official measurements of the schooner John Smeaton, recently launched by the Superior Shipbuilding Co. for the Bessemer Steamship Co. are: Register length, 458 feet; tonnage length, 456 feet; breadth, 50.2 feet; depth, 25 feet; tonnage depth amidships, 24.66 feet; under tonnage deck, 4,904.04 tons; enclosed spaces above tonnage deck, 145.80 tons; total gross tonnage, 5,049.84; total deductions from gross tonnage, 324; register or net tonnage, 4,725.84. This makes the Smeaton 356 gross and 278 net tons larger than the schooner John A. Roebling and 123 gross and 427 net tons larger than the steamer Samuel F. B. Morse, built for the Bessemer company last year.

ENORMOUS MOVEMENT OF FREIGHT.

ORE SHIPMENTS, NOTWITHSTANDING THE LATE OPENING OF NAVIGATION ON THE GREAT LAKES, ARE 100,000 TONS AHEAD OF LAST YEAR, AND STILL FREIGHTS ARE STEADILY ADVANCING.

The one item of special interest in the trade of the great lakes just now is the movement of iron ore, as the mining companies, prompted by the unprecedented demand that exists in all lines of steel and iron manufacture, have set out to move every pound of ore that it is possible to take from the mines, and it is this condition, coupled with unusually large shipments of grain since the first days of navigation, that has caused $1 a ton freight, which is double the rate of a year ago, to be paid on some ore shipped from the head of Lake Superior. It was confidently expected that the June shipments of ore would reach the 3,000,000-gross-ton mark, but there is some disappointment on this score. The shipments for June as reported from all the mines to the association of ore dealers in Cleveland, foot up 2,622,894 gross tons, as against 2,278,134 tons in June a year ago, and the total from the opening of navigation to July 1 is 4,742,961 tons, against 4,612,173 tons on July 1, 1898. The increase for the season to date of more than 100,000 tons is certainly remarkable, in view of the fact that the opening of navigation was some fifteen to twenty days behind 1898. A question of importance to all interests in this connection is how long can the pace be kept up? The mining companies would move 16,000,000 tons of ore in the present season if it were possible to get it out of the mines, but they are even now getting along to the period when stock piles will be exhausted. Still the tendency from day to day in the lake freight market is toward higher figures, as there is a steady demand for grain carriers at rates from both Chicago and Duluth that are better than the ore rates. Since the advance to 40 cents in the rate on coal to the head of Lake Superior, coal shippers have been fairly well supplied with vessels for Duluth and Superior, but they are no better off than they have been all season as regards Lake Michigan shipments. A 50-cent rate to Milwaukee is almost double the price paid a year ago, and yet Milwaukee shipments are very much behind previous years, so much so that it is claimed Milwaukee dealers can only care for the city trade and are meeting with competition in the country districts in coal that is shipped all rail from Indiana and Illinois.

HIGH PRICES ON NEW SHIPS.

"I have concluded that it is about time for the ship owner who wants new vessels to rest long enough to take his bearings," says a Cleveland owner who has a couple of new steel steamers under contract. He had asked for a price on a steamer of 500 feet over-all length and 52 feet beam, with triple expansion engines and Scotch boilers to furnish about 1,700 horse power, and was told that such a vessel, even for delivery very late next season, would cost him $360,000. The price staggered him. Quite a sum would have been added if he had asked for quadruple engines and water tube boilers.

"Probably it is just as well," he continued, "that these very high prices have been reached. The men who are in the business and have been through good and bad times will await a settlement of the market for materials, and the high prices will shut off new contracts, at least to an extent that will make vessel property that is already in service quite valuable for the next two or three years. I feel that we are almost absolutely certain of general business activity, not for a year but for four or five years. Still, values must come down materially within a very short time, and we must also take into account the enormous capacity of the kind of ships that are now on the stocks."

Then he picked up a lead pencil and made some figures. There are now under way in the several ship yards of the lakes eighteen very large freighters. A few of them are to come out before the close of the present season, but most of them are for next year. The lists referred to does not include the two Welland-canal size steamers building at the Craig yard in Toledo for Atlantic coast service, nor the small steel lumber carrier building at West Bay City. These eighteen big vessels will move in a single season, running light, on conservative estimates as to capacity, both for vessels towing and steamers running without tows, full 2,360,000 gross tons of ore.

NEW YORK SHIP BUILDING CO. READY.

A dispatch from Camden, N. J., states that the contract for the purchase of the 120 acres of land in South Camden by the New York Ship Building Co. has been concluded with the Camden Land Improvement Co. President Henry G. Morse of the ship building company said that active work on the construction of the plant will begin within a few days, and that within two weeks 1,000 men will be employed. The site has a water front of 3,500 feet and a mean depth of 40 feet. About 7,000 tons of steel have been purchased for the construction of buildings. Rails for the yard tracks have been delivered and a large part of the machinery has been contracted for. It is the intention of the company to build all classes of vessels.

Mr. George Clark, formerly superintendent of construction at the yard of the Newport News Ship Building & Dry Dock Co., has accepted a similar position at the Cramp yard, Philadelphia.

Cable reports from Bremen are to the effect that the North German Lloyd Steamship Co. has determined to build a vessel that will surpass the Kaiser Wilhelm der Grosse in speed as well as in other respects.

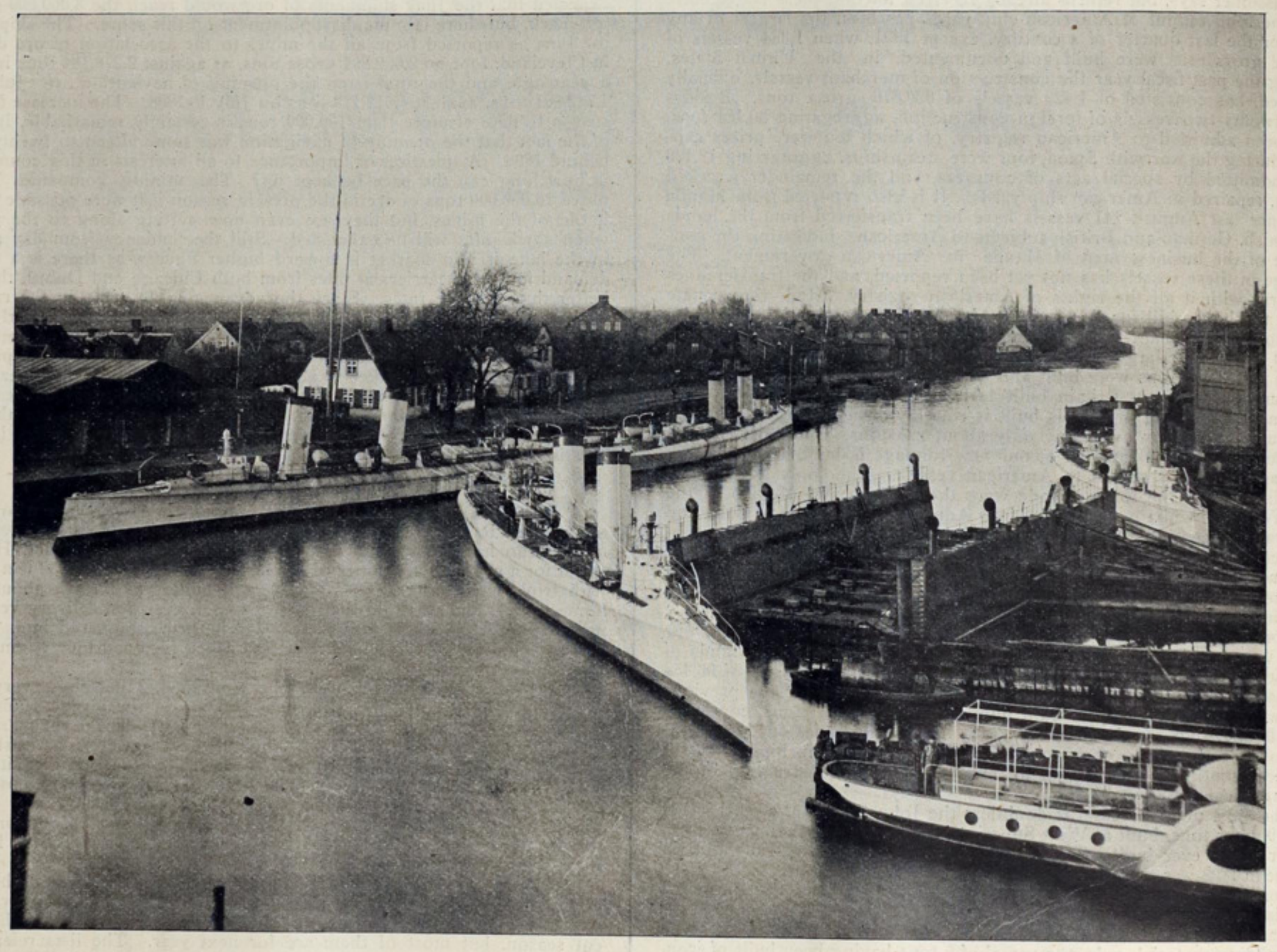
WORLD'S FASTEST TORPEDO CRAFT.

FOUR DESTROYERS RECENTLY CONSTRUCTED BY F. SCHICHAU OF ELBING, GERMANY, FOR THE CHINESE GOVERNMENT—THEIR REMARKABLE RECORDS FOR SPEED AND ENDURANCE.

Elsewhere in this issue of the Review will be found a brief resume of some of the accomplishments which C. A. Parsons of England looks for with development of the steam turbine. Serious consideration must needs be given to his claims for the reason that he has demonstrated with an experimental vessel—the Turbinia—the soundness of some of his theories. This Parsons vessel from the date of the British naval review at Spithead, when she steamed 34½ knots, until the latter part of 1898, held the speed record of the world for any floating craft. Late last year, however, the palm was taken from the Turbinia by the torpedo boat destroyer Hai Lung, built by Herr F. Schichau of Elbing, Germany, for the Chinese government. This vessel attained a speed of 36.7 knots or 42.26 statute miles.

The Hai Lung was one of four destroyers built by Schichau for the Chinese navy, each of which with full trial trip load aboard attained speeds exceeding 35 knots. The performance of these vessels is the more remarkable when it is understood that the Turbinia represented in her machinery installation a distinct innovation applied under special conditions, while in the case of the German-built vessels the Schichau balanced type of engines, to which their success is attributed is at best simply a modification of existing ethics in engine building practice. Reports of the trials of the Chinese destroyers credit them with attaining their record-breaking speeds without effort. That the German builder has also solved the problem of building small, fast vessels of this type with a steaming radius of from 3,000 to 4,000 sea miles would seem to be proved by the trip of the four destroyers herewith illustrated to their port of delivery. They steamed through the Baltic, the German ocean and Biscay, around Gibralter, through the Mediterranean sea to Port Said, and finally made the run from Port Said to Colombo without touching at the port of Aden—a distance of 3,550 sea or 4,100 statute miles. The remarkable feature of this performance is well exemplified by the statement that when the vessels arrived at Colombo each had on board a considerable quantity of coal.

The Chinese destroyers are each 60 metres in length and have a displacement of 280 tons. They are engined for 6,000 horse power and with natural draft the boats make about 30 to 31 knots. Completely equipped with fully-filled coal bunkers (67 tons of coal aboard) and with a supply of water for fully 5,000 miles steaming, the boats with forced draft made a mean speed of 33.6 knots for several hours in the open sea. That Herr Schichau understands the construction of torpedo craft is evidenced by the fact that there have been turned out since the establishment of the works in 1837 upwards of two hundred torpedo boats and destroyers. At present he is building twenty destroyers for different governments on the strength of the records made by the vessels of the Hai Lung class.



TORPEDO BOAT DESTROYERS BUILT BY F. SCHECHAU, ELBING, GERMANY, FOR THE CHINESE NAVY.—FASTEST VESSELS IN THE WORLD.

A NOVELTY AT THE CRESCENT SHIP YARD.

Lewis Nixon has the contract for the construction of the initial safe float of the design recently patented by Joseph B. Anderson, and the little vessel is now well under way at the Crescent Ship Yard, Elizabethport, N. J. The float is of metal and elliptical in shape, being 22 feet long and 14 feet broad. The device is destined, it is hoped, to revolutionize present methods for the transportation of bullion by water. It can, of course, be utilized for mail matter and other valuables as well. The safe, which is of course water tight and fire proof, is affixed to the deck of a steamer in such manner that it can be quickly or even automatically released in event of an accident, and it will then float until towed into port, a light ignited by contact with the water showing at night in the form of a flame four feet in height. In day time its presence may be detected by a fog horn and bell, which it is claimed will blow and ring automatically. The inventor says that the float will be likely to maintain an upright position by reason of its shape and that this can be insured by placing the heavy metals of the cargo at the bottom. The phosphide of calcium light which it is proposed to use on this float is already in use on the Franklin life buoys, to which the government has given its endorsement, but it is suggested that a storage battery could be installed and an electric light used with little difficulty were it preferred.

SUEZ CANAL TRAFFIC.

Traffic through the Suez canal during 1898 showed an increase which contrasts satisfactorily with the falling off of the tonnage making use of that route in 1897. The results of the latter year were affected materially by the combination of famine and plague in India and of drought in Australia, and the total receipts of the canal declined to about 75,500,000 francs. In 1898 the revenues of the canal company rose to 88,000,000 francs, and this gain in gross revenue was actually accompanied by a reduction in the total operating expenses. The growth of the business which passes through this great commercial waterway may be measured by the fact that during the past year the total tonnage amounted for the first time to over 9,000,000 tons, against only 7,000,000 tons as recently as 1890. Two-thirds of the aggregate was under the British flag, but not a small proportion of the increase is ascribed to the opening of new lines for the purpose of developing eastern trade by Germany and other countries. It may be noted also that the increasing interest of the United States in the East had its reflection in the rise of the canal tonnage under the American flag from 194,000 tons in 1896 to 316,000 in 1898.

THE BERMUDA DOCK.

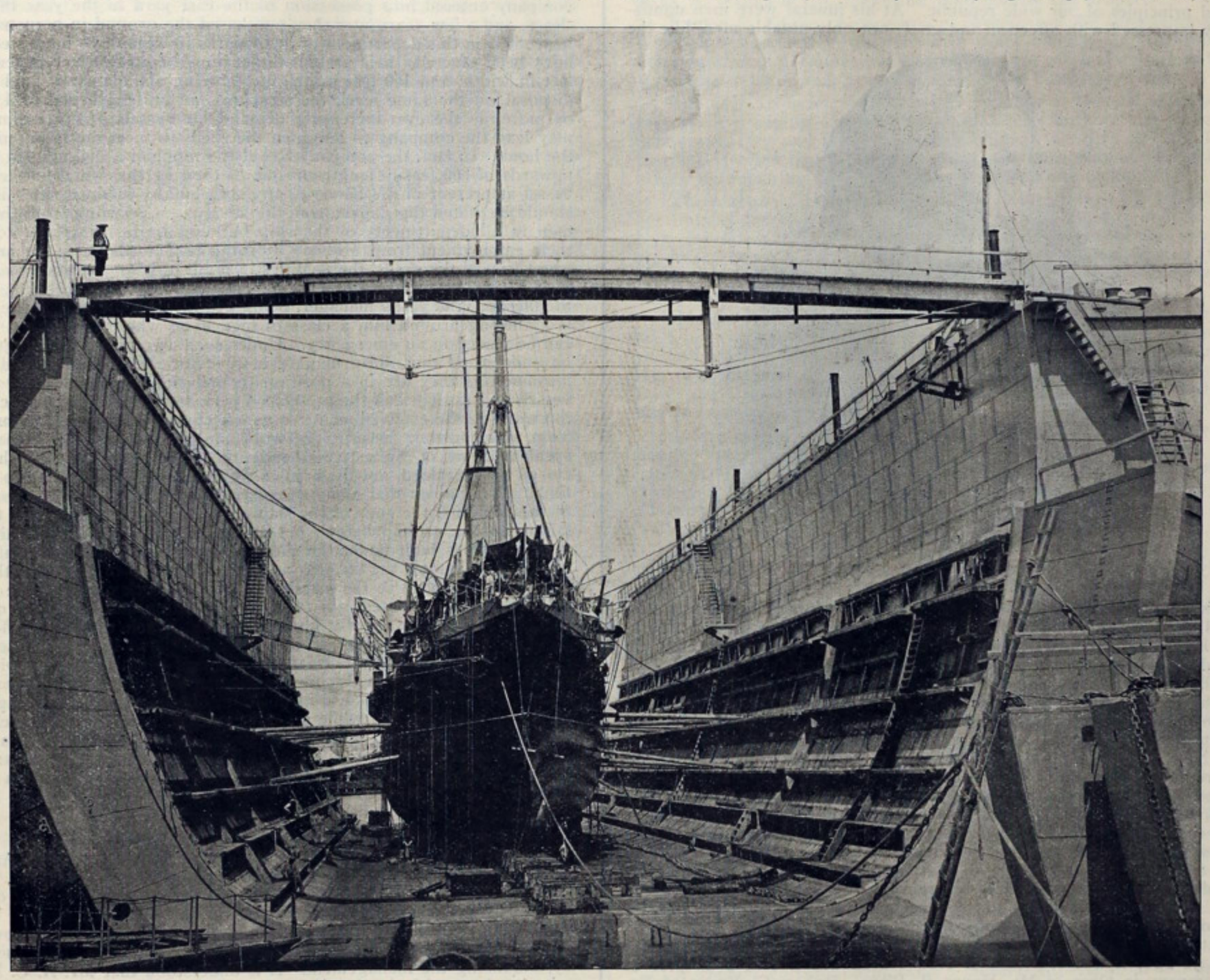
A FLOATING STRUCTURE MAINTAINED BY THE BRITISH GOVERNMENT FOR THE USE OF ITS WAR VESSELS IN WEST INDIAN WATERS.

Now that the United States is to have the largest floating dry dock in the world, an especial degree of interest attaches, on the part of our engineers and ship builders, to other structures of this character that are of more than ordinary dimensions. One of the largest floating dry docks maintained by the British government is that at Bermuda, and while it has proven too small to answer all purposes and will have to ere long be replaced by a larger one, it is still possessed of some distinctive features. The photograph herewith reproduced was taken when the British warship Tourmaline was in the dock. While she is not an extraordinarily large ship, the Tourmaline is of good size; yet, as will be seen in the picture, she far from occupies all the space that can be used by boats when in the dock, which has been named Bermuda.

This mammoth dry dock was built in North Woolwich, England, in 1868 and was sent to Bermuda the following year in tow of the Black Prince and the Warrior. The Terrible also assisted in steering the dock across the ocean, while the Lapwing acted as a scout. The dock, while being towed across, was filled with bricks and other heavy material to prevent it from capsizing. The dimensions are: Length over all, 381 feet; length between caissons, 330 feet; breadth over all, 123.9 feet; breadth inside the wall, 84 feet; depth over all, 75 feet. The total weight is 8,340 tons. The basin of the dock is 52 feet deep below the low-water mark. Nearly 1,250,000 cubic feet of sand and solid rock had to be dredged up to make space in which to let the dock rest when she is taking a boat. The dock is kept in position by three iron girders, 112 feet long, and they are fitted so as to rise and fall with the dock.

Three million rivets were used in this structure. The rivets weighed 800 tons. The dock is divided longitudinally into eight watertight compartments and transversely into six water tight compartments, so that it contains, not including engine rooms, pumpwells and the like, 48 different watertight compartments, by means of which the position of the water required for operation can be regulated. There are eight pumps of ten horse power each, which will lift sixteen tons of water a minute. The dock, when filled, holds 37,000 gallons of water. All of the different compartments are fitted with valves worked from the upper deck. By putting 4,000 tons of water in the upper chamber, on one side only, the dock may be careened so as to bring the keel 5 feet out of water, an advantage for cleaning possessed by few, if any, other large floating dry docks. The dock at Bermuda is capable of lifting a ship of 10,000 tons displacement. When not in use for naval purposes, large merchant vessels are sometimes put into the dock to be cleaned or repaired.

The dock is used by the British North American and West Indies squadron, Vice-Admiral Sir John Arbuthnot Fisher, K. C. B., commanding. Bermuda is the rendezvous of that squadron. In this fleet of British vessels are ships of over 10,000 tons displacement, one of them being the Renown, Admiral Fisher's flagship. The Renown is a first-class battleship of 12,350 tons. She carries fourteen guns and is a twin-screw ship. The Renown is too large to get into the floating dry dock, so a still larger dock is now being built in England to accommodate the larger boats. This dock, it is said, will be sent to Bermuda when finished.



BERMUDA FLOATING DRY DOCK LIFTING THE BRITISH WARSHIP TOURMALINE.

MERCHANT MARINE OF NORWAY.

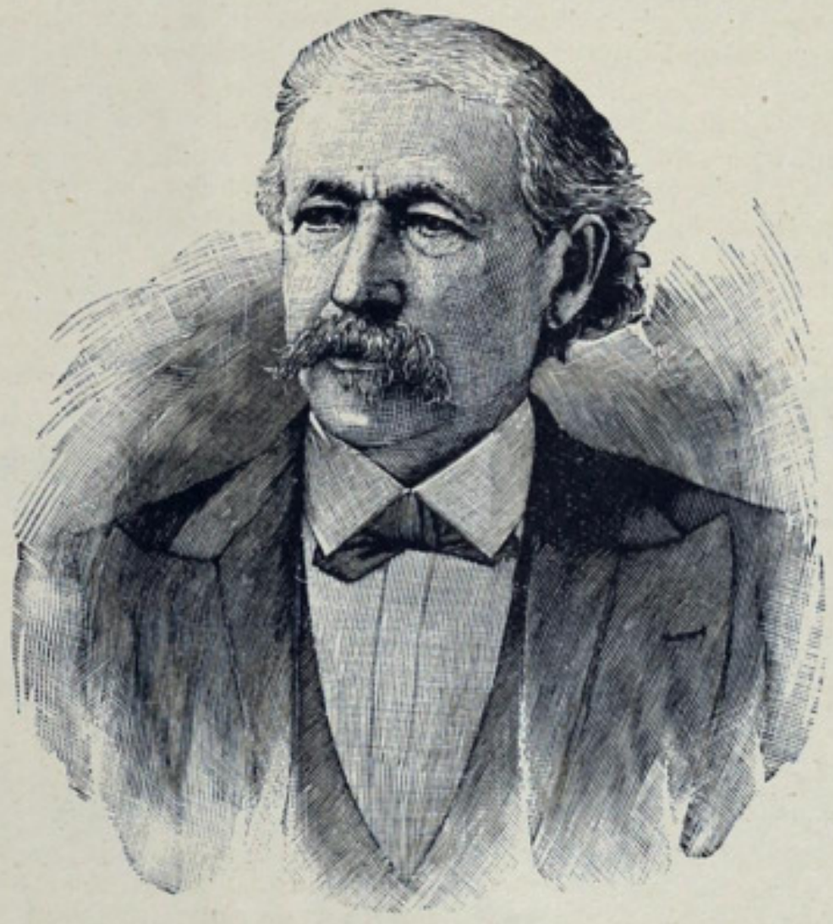
No slight degree of interest has recently been manifested in the merchant fleet of Norway. According to statistics of recent compilation the Norwegian mercantile fleet was diminished last year by 128, but the total tonnage increased to the extent of 30,383 register tons; that is, the number of vessels added to the register in 1898 was 166, measuring 184,010 register tons, while 294, measuring 153,627 tons, were taken off the register. In Norwegian yards last year thirty-eight ships, of in all 23,564 tons gross, were built, thirty-two of them being steamships (20,986 tons), and six sailers (2,578 tons). Outside of Norway twelve steamships, measuring altogether 30,471 register tons, were built. The sailing vessels were all of wood, while only one of the steamships was wooden, the rest being built of steel.

The purchase of ready made vessels by Norwegian owners numbered 116, the total measurement of which was 129,975 register tons; of these fifty-five were steamships (72,068 tons), two being of wood (634 tons together), thirty-two of iron (32,663 tons), and twenty-one of steel (38,-771 tons); sixty-one were sailing vessels (57,907 tons), twenty-one of them being of wood (12,916 tons), and forty of iron (44,991 tons). The number of vessels lost in the course of the year was 177 sailing vessels of 85,-994 register tons, and eighteen steamships of 14,201 tons; of the sailers, 172 were of wood and five of iron, while of the steamships lost four were wooden, seven iron and seven steel. The sales of vessels by Norwegians to foreigners comprised fifty-two sailing ships (17,987 register tons), fifty-one being of wood and one of iron, and twenty-one steamships (25,151 tons), one being built of wood, twelve of iron and eight of steel. No steamships were dismantled or broken up, but twenty-six sailers underwent one or the other of these operations, measuring altogether 10,294 register tons.

THE LATE HENRY B. PLANT.

The will of the late Henry B. Plant, whose death was noted in the Review last week, has been admitted to probate. The executors include Morton F. Plant, vice president of the Plant system, Margaret J. Plant, widow of the deceased, Lynde Harrison, who has long been Mr. Plant's legal adviser, George H. Tilley, who was Mr. Plant's secretary for several years and Robert G. Erwin of Savannah, Ga., one of the vice-presidents of the Plant system. No estimate of the amount of the estate is given in the will but it is said to be valued at $8,000,000 to $10,000,000. Annuities created by the will would alone call for the establishment of a trust fund of not far from $2,000,000. The trustees are directed to pay from the income of the estate $30,000 a year to Margaret J. Plant, $30,000 a year to Morton F. Plant and $10,000 a year to Henry B. Plant, the testator's grandson, aged four years.

The funeral of Mr. Plant was very impressive. In a letter to the Review descriptive of the service, Mr. J. Stuart Thompson, secretary to Morton F. Plant, says: "When we took the remains of the fine old gentleman to their last resting place at Branford, Conn., there were many hearts filled with sorrow but comforted by the thought that a man of wider influence for good or of greater geniality had not lived among us for many years. He was a representative citizen, fulfilling the best and most hopeful principles of our wide republic. At his funeral were men unmistakably impressed with affection and grief; not only notable men, like the



governors of several of the southern states, and representative men, like Mr. H. M. Flagler, Senator Platt, Vice-President Hall of the New York, New Haven & Hartford Railroad, John A. Stewart, president of the United States Trust Co. and former Assistant Post Master General, Col. Wm. B. Thompson, but also old employees, who began with him thirty to forty-five years ago as young men, and who had risen in his honored service to responsible positions. The funeral was a noble and tender tribute of respect and honor. A special train of private cars took the cortege from New York to Branford, Conn., where Mr. Plant was born, and gathered about the station of the little country town were the old people who were wont to greet their great townsman familiarly and respectfully with his name "Henry." I shall never forget the high banked flowers under the tent upon the hill where he was laid to rest. Among affectionate tributes paid him was that of the young men of his office, who had so often answered his cheery 'good morning,' and who bore on their shoulders, as their last service, his remains, bidding him a last 'good night,' in the confidence that so lovable a man will forever receive the rest and honor that his great life merited."

At a meeting of the directors of the Plant Co. held in New York a few days ago, Lynde Harrison of New Haven was elected a director of the company in place of Mr. Henry B. Plant. Robert G. Erwin of Erwood, Ga., was elected president and Mr. Morton F. Plant of New York was elected first vice-president. Subsequently at meetings of the directors of the several railroad companies of the Plant system Robert G. Erwin was elected president of the Gardimaly, Florida & Western Railroad Co., Morton F. Plant was elected president of the Alabama Midland Co. and Lynde Harrison was elected president of the Brunswick & Western Railroad Co. The directors of the Plant Investment Co. present were Messrs. R. G. Erwin, Henry M. Flagler, Morris K. Jesup, Morton F. Plant, E. B. Haskell and Lynde Harrison.

An unusual ceremony at a launch was that which attended the launching of the 4-masted schooner Anna Murray at Camden, Me., June 24. It was no less than the blessing of the vessel and her baptism with holy water by Bishop Healy of Portland, in the same form in which were consecrated the caravels of Columbus. Altar boys, incense and sacred oils, with the full ritual and prayers were used. The vessel is 210 feet long, of 3,000 tons, and will be put in the West India trade out of New York.—Marine Journal, New York.

Tourist Excursions.—From June 24 to July 10, inclusive, the Nickel Plate road will sell special tourist tickets to Denver, Colorado Springs, Pueblo and Utah points. Through palace sleepers and unexcelled dining car service via the Nickel Plate road Special low rates. Ask agents Nickel Plate road for particulars. 68 July 10.

COVERED BERTHS IN SHIP YARDS.

The Review a short time ago made reference to the covered ship building berths recently instituted at Wallsend-on-Tyne, England. A demonstration of the practical utility of the structures is afforded by a communication just received by the state department from Consul Metcalf at Newcastle-on-Tyne. The consul says:

"The heavy rainfall during the past week, which led to a practical stoppage of work in the outside department in all the ship yards on the northeast coast, conduces to afford an indisputable illustration of the advantages of covered ship berths. Strange as it may appear, the firm of Messrs. C. S. Swan & Hunter, Limited, Wallsend, is the only ship building firm in this country the representatives of which have gone to the extraordinary outlay entailed in the erection of stupendous structures to inclose the vessels on the berths. The idea of carrying such a project into effect originated in the mind of Councilor G. B. Hunter, the managing director of the company, conceived, it is understood, during a business tour in America, the huge structures inclosing the exhibits at the famous Chicago exposition suggesting to his mind the practicability of the development of the principle on a more enlarged scale in the covering of vessels in course of construction on the berths. The firm named have no fewer than three ship yards—their east, west, and pontoon yards. The company entered into possession of the east yard in the year 1883 on a lease, and a few years later they purchased the ground in perpetuity, and hence it is in this department of their works in which two huge steel sheds have been erected, their present dimensions being 500 feet in length, 82 feet in width, and 100 feet in height. Having abundance of land at their disposal on the same level, the structures an be lengthened to 1,000 feet or more, as the ever-increasing demand for vessels of large dimensions may lead the company to lengthen the sheds to meet the requirements of the hour. In fact, the company has at the moment a magnificent steamer upwards of 600 feet in length on one of their berths, which is the largest vessel at present in the hands o. any ship builder in the British isles. It should be stated that, apart from the advantages accruing from the workmen in all departments of the ship building trade being able to follow their employment from Monday morning to Saturday at noon under the protection of the sheds, the facilities in point of labor are such that steady men of the best class are securing engagements with the firm, Mr. C. Stephenson, the yards manager, being gratified by the knowledge that he is gathering around him a class of men upon whom the utmost reliance can be placed in an emergency. Under such a condition of things, it will be understood that the firm gain in turn for the enterprise and outlay, inasmuch as they are in a position to undertake to build and equip the vessels in less than half the prescribed period essential for the execution of the work in the establishments in which climatic considerations naturally form an important factor. The workmen in all the outside departments speak in terms of highest commendation of the advantages which the inclosed berths afford, not the least of which is the greater safety to life and limb. It is known that many lives have been lost through the oscillation of the uprights, the ends of the staging becoming detached, and the men falling to the ground below; but as uprights are dispensed with in the case of vessels built under the sheds at Wallsend, a spirit of confidene is engendered among the riveters and other sections of the men, the stagings being attached to the massive still trellis work of which the sides of the sheds are composed. In point of expedition and the finish of work, the men participate largely in the facilities which the sheds afford. A plant in which all the latest improvements have been introduced, and driven by electric energy, is at the disposal of the men, by which the plates and bars are raised from the ground with the utmost promptitude by electric cranes and placed in position, one huge crane working on the roof with a 60-foot jib, while several cranes of lesser power travel immediately under the roof, which is of strong plate glass, as well as part of the sides which have been inclosed, with the result that the workmen are exempt from the discomforts not only of a stormy day, but of a passing shower."

AMERICAN SHIP BUILDING CO.

A dividend of 1¾ per cent. on the preferred stock of the American Ship Building Co. (consolidated ship yards of the great lakes), payable July 15, is announced. This is the first installment of the regular dividend of 7 per cent per annum guaranteed on the preferred stock. The arrangement of principal offices of the company in Cleveland is now about completed and changes are being made every few days along the line of systematizing the management. It is understood that Mr. A. C. Diericx, who has been with the American Steel Barge Co. for several years, is to be chief hull draughtsman in the Cleveland office and Mr. A. Rankin is to have charge of machinery designs. With some eighteen or twenty very large ships under construction for delivery during the balance of the present season, or on the opening of navigation next year, the consolidated companies have about all they can do for nearly a year to come, and there is not much going on in negotiations for new contracts. Under the present very prosperous condition of trade on the great lakes, ship building orders would probably be doubled, if it were not for the prices that are asked by the steel manufacturers. The figures quoted on new ships are so very high that both owners and builders are forced to await a more settled condition of the market.

With a reorganization of affairs in the Detroit works on July 1, due to the consolidation, the following list of officers in the Detroit Ship Building Co. is announced: President, Alex McVittie; vice president, W. C. McMillan; secretary and treasurer, M. E. Farr; consulting and designing engineer, F. E. Kirby; general superintendent, C. B. Calder.

Official government measurements give the passenger steamer Illinois, recently constructed at the yard of the Chicago Ship Building Co., a tonnage of 2427 gross and 1,468 net.

Capt. E. J. Howard of Jeffersonville, Ind., has been offered a controlling interest in the Cincinnati Marine Ways and is considering the proposition.

POSSIBILITIES OF THE TURBINE.

THE INVENTOR OF THE TURBINIA, C. A. PARSONS, WRITES OF HER ADVANTAGES —HE PROPOSES A TYPE OF UNARMORED CRUISERS OF 48 KNOTS SPEED.

A subject of general interest in the field of marine engineering just now is the derivation of power for vessel propulsion from steam turbines. Discussion of this force heretofore presented has been open to doubt, not only on the score of authenticity of the assertions made, but also from question as to the reliability of the source of information. Especial value therefore attaches to an article on the subject in the current issue of Cassier's Magazine by Hon. C. A. Parsons of England, inventor of the type of turbine bearing his name, and the builder of the Turbinia, the first vessel to which this force was applied.

Mr. Parsons deals at the outset with the first problem which presented itself to him, that of constructing a steam turbine of good steam economy and with a comparatively moderate speed of revolution, so as to permit of its being coupled directly to a dynamo. Some of the advantages claimed for steam turbines over ordinary engines are the small space occupied, light weight, low first cost, reduced upkeep and attendance, better governing, together with the fact that no expensive engine foundations are required. Mr. Parsons is emphatic in the declaration that the most important field for the steam turbine is in the propulsion of ships, by reason of the imperative necessity for some form of engine which shall be light, capable of perfect balancing and economical in steam. The disappointments which followed the construction of the Turbinia will be full of interest for marine engineers generally. They were induced, of course, by the speed, which was so much slower than had been anticipated as to make it apparent that there was some radical defect in the propellers. How it was discovered that there was an insufficiency of blade area, or that, in other words, the water was torn into cavities behind the blades—cavities which contained no air but only vapor of water—has heretofore been detailed. On the obviation of all vibration so pronounced in all other fast vessels, however, Mr. Parsons lays considerable stress. The economy of engines is also demonstrated, he says, by actual figures, the consumption of steam per indicated horse power for all purposes at 31 knots speed being given as 14½ pounds, or in other words with a good marine boiler the coal consumption would be considerably under 2 pounds per indicated horse power. At a recent trial to test the endurance of the machinery it was demonstrated that the Turbinia can maintain a speed of 30 knots for three hours.

The information is given that each of the torpedo boat destroyers of the Turbinia kind building for the British government, and which have been previously referred to in the Review, will be fitted with turbine engines of 12,000 horse power. In the case of these vessels, as with the Turbinia, the great claim is relative to the saving of weight, the horse power per ton of total weight of machinery including boilers in working trim being in the case of the new turbine equipped vessels 75 as compared with 48 in the case of ordinary engines. Although the claim is made that the turbine engine offers many advantages to the naval architects of Atlantic liners, it is admitted that the highest speeds will be attained by short-passage vessels.

Perhaps the most interesting feature of Mr. Parsons' article is his final observation. He says: "In conclusion it may be interesting to give a few particulars as to what may ultimately be reached in fast-speed, unarmored cruisers of moderate size, though doubtless it will take some courage to enter upon the construction of such a vessel. Still, something like this will probably be attempted before long: A vessel of 3,000 tons displacement, 450 feet in length, 42 feet beam and 14 feet maximum draught of water, carrying turbine engines and boilers of 120,000 maximum horse power, the boilers being of the water tube type arranged in two tiers. This vessel could steam economically at 16 knots speed, but would, in emergency, be capable of increasing her speed to 48 knots and maintaining this speed for three hours; or she could maintain a speed of 45 knots for eight hours. She would be difficult to hit with shot, and her speed being 18 knots greater than that of any locomotive torpedo, she could take her chance in this respect. A few such vessels would be of immense tactical value to a squadron in time of war."

KRUPP ARMOR MANUFACTORY FOR AMERICA.

The Gruson Iron Works is a new iron company organized under New York laws, with a capital stock of $500,000. It has acquired the exclusive right for the United States, under contract with Fried. Krupp-Grusonwerk, of Magdeburg-Buckau, Germany, to manufacture Gruson chilled cast iron rotating turrets and other chilled armor constructions for coast defence. It will also manufacture minimum port gun carriages, and all machinery used in connection with armored fortifications. Under the contract, the firm of Fried. Krupp-Grusonwerk convey the sole right to use their processes, experience and information. They will also place at the disposal of the Gruson Iron Works the personnel necessary to superintend the erection and installation of the necessary plant, and to explain and start the manufacture in a proper and complete manner, so that defensive structures as were heretofore manufactured in Germany will in the future be made of American materials and by American workmen. The officers of the company are: P. H. Griffin, president; C. W. Barnum, vice-president; A. E. Piorkowski, secretary; T. Guilford Smith, treasurer. The directors are as follows: P. H. Griffin, of P. H. Griffin Machine Works, Buffalo, N. Y.; Thomas Prosser, representative of Fried. Krupp for the United States, New York; C. W. Barnum, of Messrs. Barnum & Richardson, Lime Rock, Ct.; T. Guilford Smith, vice-president New York Car Wheel Works, Buffalo, N. Y.; A. E. Piorkowski, captain I. G. A., representative Fried. Krupp-Grusonwerk, Magdeburg, Germany; Ernst Thalmann of Messrs. Ladenburg, Thalmann & Co., New York; David Townsend, Philadelphia, Pa.; S. Singer, Paris, France; Herbert L. Satterlee of Messrs. Ward, Hayden & Satterlee, New York.

AROUND THE GREAT LAKES.

Capt. H. Root, late of the steamer Reynolds, died at his home at Perrysburg a few days ago of paralysis.

The steam yacht Starr, which has just been completed at a cost of $11,000 for W. J. Starr of the Starr Lumber Co. of Eau Claire, Wis., will be taken via the St. Lawrence to the Atlantic coast.

River Queen is the name suggested for the three-deck excursion steamer that is to be built by the Detroit Ship Building Co. during the coming fall and winter for service between Detroit and Port Huron.

According to report, $60,000 was the price paid by the Tonawanda Iron & Steel Co. for the steamer Curtis and consorts Reed, Holland and Fassett, which they recently purchased from Nelson Holland.

Capt. McLean, who has been in the lake built steamer John J. Hill ever since she went to the Atlantic coast to engage in the coal carrying trade, has been appointed mate on the Vanderbilt yacht Conqueror. Capt. B. D. Melvin succeeds him in the Hill.

The rumor that the Chapin mine, one of the famous producers of the Lake Superior ore region, had been leased for twenty years at $4,000,000 to one of the steel consolidations, is positively denied by Mr. L. C. Hanna of M. A. Hanna & Co., Cleveland, who control the property.

Lyman E. Cooley, American vice-president of the International Deep Waterways Association, together with other officials of the association and a number of prominent citizens of Chicago, will make a trip to Canada in August to be present at the opening of the Soulanges canal.

Col. G. J. Lydecker, United States engineer at Detroit, will open bids July 24 for dredging at Cheboygan and Alpena harbors and in Saginaw, Sebewaing, Pine and Belle rivers of Michigan. On July 20 Capt. Chester Harding, United States engineer corps, will open bids at Grand Rapids, Mich., for repairing the government pier at White Lake, Mich.

The schooner Mars has been sold by T. R. Lyon to the John Schroeder Lumber Co. of Milwaukee for $1,000. The Mars was built in 1871 at New Jerusalem, O., her original cost being $11,000. She was one of the old Ward fleet of vessels which consisted of the Mars, Juptier, Saturn, Planet, Herschel, Mercury, Venus and Uranus. She will be converted into a tow barge.

Repairs have been completed at Milwaukee on the schooner Aberdeen, owned by Henry J. Pauley, which stranded at Muskegon last autumn. She has received a large amount of new outside plank and ceiling, new main keelson chords and top chords, assistant and rider keelsons, new between decks throughout, an entirely new set of main deck beams and a new main deck.

It is understood that Barry Bros., Chicago tug owners, who recently bought the steamer H. E. Packer, will very probably purchase several cargo vessels, if the purchase of all lake tugs by the new company of vessel owners is carried out and they are not retained in the management at Chicago. They are said to be figuring for the purchase of the Lehigh Valley fleet of wooden vessels.

Members of Marine Engineers' Beneficial Association, No. 87, of Detroit, are already at work on a vest-pocket annual to be issued in January, 1900. They propose to get out a pocket companion that will be valued by the marine engineers and kept by them for daily reference. An edition of full 1,000 will be gotten out. The work is in the hands of Mr. Geo. B. Milne of 143 Brainard street, Detroit.

Maj. Clinton B. Sears, United States engineer at Duluth, has opened bids for revetment work at the Portage lake ship canals. Hugo & Tims of Duluth submitted the lowest bid, $132,273.50. Other bidders were Powell & Mitchell, Marquette, Mich., $147,622.40; Collier-Weeks Co., New York, $115,113.80; Porter Bros., Duluth, Minn., $144,201.20; Butler-Ryan Co., St. Paul, Minn., $169,629.00; James B. Donnelly, Buffalo, N. Y., $173,228.60.

Malitoa and not Texas will be the name of the steel steamer that is to be turned out from the Lorain works of the American Ship Building Co., some time in August, for the Minnesota Steamship Co., which is represented in vessel matters by Pickands, Mather & Co. of Cleveland. This is one of the two steamers bought while on the stocks from A. B. Wolvin and others. The other vessel, the Pennsylvania, has been allowed thus far to retain the name given her soon after she was started in the ship yard. Malitoa will correspond with the names of all other vessels of the Minnesota line, which begin with M and end with a.

A Detroit correspondent says: "Several experts from Chicago held a survey on the steamer City of Rome here, a few days ago, preparatory to an action pending regarding injuries sustained by the vessel, which was aground in Lake Erie below the mouth of the Detroit river during the ice jam of December last. The Chicago party included J. B. Bates, Capt. James A. Calbick, Capt. Keith, Capt. Rand of the City of Rome, and W. J. Wood, naval architect. Mr. Wood took away numerous sketches and measurements, with a view to making two scale drawings of the vessel in her present condition The case will probably come up for trial about the middle of July.

Col. Jared Smith, United States engineer at Cleveland, a few days ago opened bids for the Toledo harbor improvement work. Several pieces of dredging and the erection of a dyke of considerable length is included. The Lydon & Drew Co. of Chicago, were the lowest bidders, and will probably be awarded the contract. Other bidders were the Buffalo Dredging Co. and Edward J. Hingston of Buffalo; Atlantic, Gulf & Pacific Co. of New York; G. H. Breyman & Co. of Toledo; Carkin, Stickney & Cram of Detroit; James Rooney of Toledo; James B. Donnelly of Buffalo; the L. P. & J. A. Smith Co. of Cleveland, and the Morris & Cummings Dredging Co. of New York City.

Nickel Plate road excursion to California account of National Educational Association convention at Los Angeles, Cal.—Tickets on sale June 24 to July 7. One fare, plus two dollars, for the round trip. Ask agents of the Nickel Plate road for particulars. 44, July 6.

ROLLING LIFT BRIDGES.

Narrow rivers in crowded harbors of the great lakes have developed several types of lift bridges, the best-known of which is the Scherzer rolling lift bridge, built by the Scherzer Rolling Lift Bridge Co. of Chicago, and illustrated herewith. Vessel men generally are disposed to exert great influence in favor of this kind of bridge for either railroads or highways over navigable streams, the obviously just claim being made that it offers far less obstruction to navigation than the center pier swing or any other form of bridge. Saving of time and trouble to the vessel interests where a bridge of this kind is used is due to the fact that the entire channel is available for navigation, as there is no center pier obstruction, and a saving of dock space is also secured. This bridge can be made with any width of draw desired, so that vessels may pass each other freely in the draw when there is sufficient channel space, or may lie at the dock close to the bridge without interference. The bridge, which is operated by hand, steam or electric power, moves vertically and does not project over dock space. It is claimed for this form of bridge that it can be opened or closed in twenty seconds and costs no more than swing bridges of equal capacity. The four-track bridge of the Metropolitan elevated railroad over the Chicago river, in use for several years past, is of this type, and there is also in Chicago highway bridges of this kind at North Halsted street and Van Buren street. There are now under construction or contemplated an eight-track railroad bridge over the Chicago drainage canal, which will be the largest movable bridge in the world; a six-track railroad bridge at the entrance to the South Terminal station at Boston, Mass.; one double-track railroad bridge across the Chicago river at the entrance to the Grand Central station, constituting the longest movable span in the world, 275 feet; a highway bridge of 150 feet span across the Chicago river; a single track bridge for the Big Four railroad at Cleveland, and others.

SCHERZER ROLLING LIFT BRIDGE ACROSS CHICAGO RIVER AT NORTH HALSTED STREET, CHICAGO. VIEW OF BRIDGE CLOSED FOR HIGHWAY TRAFFIC.

JULY STORMS ON THE GREAT LAKES.

The forecast for July weather on the great lakes, prepared by Alfred J. Henry for the United States weather bureau chart, is as follows: While the weather of summer is the least boisterous of the year, there are yet occasional brief periods of treacherous squall winds that require the exercise of care and vigilance on the part of vessel masters. The element of danger in the squall winds lies not so much in their strength as in the sudden shift of the wind and the momentary violence experienced. The weather bureau issues warnings to vessel men whenever the conditions threaten severe thunderstorms and squally weather. These warnings may be ably supplemented by the masters themselves in observing the state of the sky, especially during the afternoon. Thunderstorms and squall winds almost invariably occur with a falling barometer; the winds are generally light and from a southerly quarter. The shift of the wind precedes the storm cloud and rain by a few minutes. The color of the storm cloud and its height above the surface of the lake quite often afford a measure of its violence. Thus, storm clouds of a dark green or olive color, especially when flying near the surface of the lake or ground, indicate severe squall winds."

A new iron derrick of large dimensions has been erected at the Roach ship yard, Chester, Pa., and will be used in the construction of the two large steamers for Hawaiian service.

MARINE INVENTIONS

Two inventions, possibly destined to play some part in maritime affairs, came from foreign sources. One is known as the oscillometer, designed to measure the oscillation of ships. This invention is controlled by Gussi, Raviza & Co. of Milan, Italy, and consists of a small electric motor mounted in gimbals, like a ship's compass, with its armature running in a vertical position at a very high rate of speed. As the ship rolls the armature maintains its original position, while the frame supporting the gimbal rings follow the motion of the ship. Suitable scales and pointers are provided, so that the amount of movement can be accurately determined. Another instrument, made by the same company and known as the gyroscopic compass, is constructed upon the same principle with a horizontal dial like the ordinary mariner's compass. The frame of this instrument, being attached to the vessel, follows any change in direction, while the motor armature continues to revolve always in the original plane. In this way any change in direction of the vessel is at once indicated.

From a German source comes an automatic guard gate for canals. This gate is practially a box with double sides but no bottom, movable around a horizontal axis connected with one side of the box. By means of a three-way valve in a well in one abutment, the hollow sides of the box, through one of the hollow horizontal axes, are put in communication either with the air, or with the water in the canal, or with the lower level of the canal. If the water in the canal, by reason of some break in the bank, descends below a certain level, it lowers a float in the well and sets free a weight, which by falling operates the three-way valve and puts the inside of the box in communication with the water in the lower canal level, and all the water in the box escapes into this lower level. The empty gate is now raised by the pressure of the water above, and under the action of the current developed it turns on its horizontal axis until it strikes certain vertical stops in the masonry. To lower the gate again, with the water at the same level on both sides, the valve is turned by a key so as to admit water to the inside of the box, when the box sinks to its normal position. Absolute contact with the sill is assured by a bolt, which is pulled out by the operation of the three-way valve.

The new steamship Kaiser Friedrich of the North German Lloyd line was rejected by that company at Bremen, Wednesday, June 28. She will be sent back to her builder, F. Schichau of Dantzig, because of her failure to make the guaranteed speed of 21 knots per hour. The vessel was contracted for in 1895. Early in the spring of 1898 the Kaiser Friedrich was delivered to the North German Lloyd Co. It has been rumored that the White Star Line was negotiating for the rejected steamship, but this rumor is denied by both companies. The Kaiser Friedrich is 600 feet long, 64 feet beam and 41 feet deep. She is fitted with twin-screw quadruple expansion engines, designed to indicate 25,000 horse power.

One of the handsomest exhibits at the National Export Exposition, Philadelphia, will be that of the Union Iron Works, San Francisco, builders of the battleship Oregon. The exhibit consists of eighteen views, each four feet in length, illustrative of the product of the ship yard. Included in the collection are pictures of the principal vessels turned out by the Union Iron Works and photographs of the engines of the battleship Wisconsin and the Japanese cruiser Chitose.

MERCHANT STEAMERS FOR WAR USES.

THE MATTER OF PROVIDING ARMAMENT AND PROTECTION FOR THEM IS DISCUSSED BY PROF. J. H. BILES, DESIGNER OF THE PARIS AND NEW YORK.

Prof. J. H. Biles, well known in this country on account of his connection with the construction of the American liners Paris and New York, and who has on several occasions given expression to decided views in the matter of providing armament and protection for merchant vessels so as to fit them for war purposes, read a very interesting paper on this subject at a recent meeting in England of the Institution of Civil Engineers. Prof. Biles said:

"The two purposes for which merchant steamers may be used by the navy in time of war are: (1) armed cruisers; (2) auxiliaries for supplying a fleet with necessaries, and as troop transports. For the former purpose they may have to fight cruisers; for the latter, they will frequently require protection from either armed mercantile cruisers or regular warships, but their ability to do the duty is undoubted, and need not be discussed. Obviously as armed cruisers vessels must have considerable speed, and their numbers are in consequence limited. Lloyd's gives the following:

20 knots and upwards	43
19 knots and upwards	35
18 knots and upwards	48
17 knots and upwards	83
16 knots and upwards	77
15 knots and upwards	128

Slower vessels will probably not be used as armed cruisers. Those speeds appear to be in most cases sea speeds. Some of the larger vessels have coal-bunker capacity, exclusive of holds, sufficient to enable them to steam for from 10,000 to 12,000 knots at 10 knots speed. We may reasonably assume that vessels of this character are better able to maintain their speed at sea than warships. Their every-day business is to run at some speed called full speed, and most of them do not run at any other speed. It does not follow that they cannot steam easily at lower speeds, but a ship which ordinarily does not steam at full speed is more likely to fall short of maintaining full speed over long periods than one which is in the habit of doing it. In consequence merchant ships have been considered to be most suitably used as scouts or despatch boats, and no attempt has been made to give them an armament equivalent to warships of anything like their size, power and speed. Some of the results of arming and fighting the mercantile cruisers of the United States navy seem to point to the ability of these vessels to cope with thoroughbred warships.

"One point is deserving of consideration. Is there not a considerable value in a floating structure, whether it is subdivided and protected as a warship, or has no more subdivision nor protection than a tramp? It floats, and it offers considerable resistance to sinking whatever kind of ship it is. Does not the result of modern sea fighting point to the conclusion that a ship is more likely to be disabled by her crew being driven from their guns than from her being sunk from the effects of shell fire? If this is so, the extra subdivision and protection of buoyancy and stability of a warship over a merchant ship may not be called into play, and the fight between the two will become one of guns versus protection of gunners. This leads to the consideration of the question of portable protection for gunners in the merchant ship. In the first-class cruisers, casemates are built into the ships. These would be impracticable in a merchant ship. But guns with shields are portable enough, and would place a merchant ship in a very favorable position compared with a second-class cruiser, as her size and deck area allow her to mount a much larger number of guns. In a paper which I read in 1894 before the Institution of Naval Architects, I endeavored to show how large mail steamers could be made as fit to fight as many first-class cruisers. Portable side armor was proposed, which should be ready for bolting on in time of war. If this system were adopted for the protection of guns, by placing them in a box battery, as the Americans have done and the Japanese are doing in the ship Mr. Dunn has designed for them at Barrow, a considerable number of guns could be mounted, which could be as well protected as in first-class cruisers. This subject is, however, too detailed to be discussed here, but it is not an impracticable operation to have portable armor put on a mail steamer.

"The work done by the American line steamers in the recent war included scouting, drawing the fire of forts to discover their strength, cable-cutting, troop, coal and water-carrying. All this work can be done by any vessels of high speed and large coal endurance, but it is worth discussing whether, having employed vessels valued at $500,000 to $2,500,000 each to do this work, it is not desirable to go a little further and make them able to do more by arming and protecting them so that they can meet second-class cruisers with the chances in their favor, and with a fair chance of holding their own against a first-class cruiser. If they can, then the number of cruisers which will be available to protect our commercial routes may be much increased, and we shall not be taking up merchant ships because their speed will enable them to successfully run away from the cruisers of an enemy who are destroying their slower sisters. The practicability of designing merchant steamers so as to be readily adapted for war purposes has been discussed in the Institution of Naval Architects. The desirability is always a subject for discussion.

"The experience of recent wars points to the desirability of having vessels which can carry large coal and store cargoes, and which have facilities for readily transferring these cargoes to warships at sea. This work could be well done by some of the large freight carriers of lines which carry mails. Special appliances would have to be fitted to these vessels, which might or might not carry these appliances in their regular work. In the construction of these vessels special consideration might be given to their use for such purposes. Some large freight carriers have ocean speeds of 15 knots, and such vessels would be of great service in time of war. A question arises in connection with the special and ordinary types of merchant vessels as to their strength to carry guns. These vessels are generally constructed of scantlings much thicker than those of warships, and many places in their decks are amply strong enough to carry guns. Possibly some parts would require special strengthening, but this could be readily applied if necessary.

"In the matter of position of machinery in relation to the water line, the later vessels of moderate and large size have their machinery and boilers not far, if anything, above the water line. With a little consideration to the question in the early stages of design and construction, it is easy to arrange the structure so that the coal which these vessels carry will give protection. Twin-screw engines and increased revolutions are tending to make merchant ships more safe in this respect. The principal point to note in connection with merchant ships for war purposes is, that a ship of any kind offers considerable resistance to the destruction of its buoyancy and stability, and, in consequence, with guns and gunners sufficient and sufficiently protected, the merchant ship need not be much, if any, inferior to many warships."

SCHERZER ROLLING LIFT BRIDGE ACROSS CHICAGO RIVER, AT NORTH HALSTED STREET, CHICAGO. VIEW OF BRIDGE OPEN FOR NAVIGATION.

A recent export order of the Babcock & Wilcox Co. was for two 100-horse-power water tube boilers which go to Yokohoma, Japan.

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At the ore mines in the Lake Superior region, as well as at the shipping docks, every effort is being made to advance the output this year to the highest figures ever known. It is reported, for instance, that at one of the stock piles of the Cleveland-Cliffs mines in Michigan, a few days ago, 1,025 tons of ore was loaded into cars in 1 hour and 35 minutes and there is scarcely a doubt but that the pace could have been kept up for 10 hours had the railroad company been able to supply cars with the rapidity required. At the Ohio mine, an open pit on the Mesabi in which steam shovels are employed, six cars of 27 tons capacity each were loaded in 12½ minutes, or at the rate of 13 tons a minute. That the activity extends to all mining operations is demonstrated by the fact that the June report from the Minnesota Iron Co.'s Auburn mine shows that the output during the month was at the rate of 15 tons per shift per man. At the Auburn mine there is a steam shovel in the milling pit and the mining is done both by it and the mills. The shovel loads from the ore bed 120 feet below the surface into tram cars, which run on a belt line through a drift to a pocket at the shaft. With every effort strained for the purpose of mining and handling the greatest possible amount of ore, some remarkable records may be expected from the Lake Superior country before the close of the season.

Letters from several heads of the big industrial organizations regarding the future of the iron trade are printed in a recent issue of the Manufacturers' Record. President E. H. Gray of the Federal Steel Co. says: "I believe we have entered upon a period of such increased consumption of iron and steel as to indicate the probability of a continuance for several years of the present world-wide activity in this industry. The indications are favorable for an ever-widening foreign market for our iron, steel, machinery and kindred products, and the increased uses for iron and steel, the development of a navy and a merchant marine, and the extension of our railways, added to the consumptive requirements of eastern countries and Africa, justify the belief in a still greater expansion of the iron and steel trade of the entire world during the next five or ten years." Practically the same view is also taken by Hon. Abram S. Hewitt of New York, and most of other authorities quoted. Some of them believe that the metal trade may experience periods of temporary depression, but that the metal market will be active for at least several years to come.

Within the next few days the final touches will have been given to another big consolidation that is very closely related to the commerce of the great lakes. The sale of all the soft coal mines in what is known as the Pittsburg district of Pennsylvania to a single company, which has been in process of formation for several weeks past under the direction of Moore & Schley of New York, is practically consummated. It is understood that the capital of this consolidation will be $30,000,000, of which $20,000,000 will be 6 per cent preferred stock and $10,000,000 common stock, and there will be an issue also of $10,000,000 of bonds. The aim is the complete control of all coal lands in the Pittsburg district, which furnishes to the railways of the northwest a very high grade of steam coal at low cost, due largely to cheap water haul over the lakes from Ohio ports to Duluth and Superior at the head of the lakes. It is claimed that in this case also the promoters are getting the property which they are taking over at very low figures, due to the fact that options taken some three months ago could not be duplicated now.

The Holland submarine torpedo boat in its improved and perfected form has recently been subjected to a number of trials preliminary to the series to be held in August in the presence of officers of the United States naval board of inspection and survey. Alterations in the boat are quite extensive and include a material decrease in the superstructure over the bow, which it is claimed will greatly increase the diving speed of the boat. A change has also been made in the position of the twin-rudders and propeller, more room has been provided for the crew by removing the steering engines aft, and a new expulsion tube for torpedoes has been fitted. The recent tests included rapidity of firing, speed both awash and submerged, and quickness in coming to the surface, taking observations and disappearing again.

It is announced unofficially that the battleship Wisconsin, building at the Union Iron Works, San Francisco, will be docked for the first time at Port Orchard, Wash., and will make her official trial on Puget Sound. The Wisconsin will be ready for docking and final overhauling next March, and the decision to send her to Port Orchard is understood to be largely due to the advice of Lieut. Ferguson, the assistant naval constructor, who has had charge of the overhauling of the Iowa. He sent charts and data which won over the department, and not only will the Oregon be docked at Port Orchard in October but she is likely to be followed at intervals by all the larger vessels of the Pacific squadron. The Iowa will leave the dock July 29.

All existing records are surpassed by the Clyde ship building returns for the first half of 1899. During the period in question there was launched a total of 125 vessels, aggregating 234,877 tons. No fresh orders were placed last month but fully six months work is on hand.

AMERICAN SHIP PLATE IN GREAT BRITAIN.

A losing fighter is proverbially ill-natured, and seemingly this must be accepted in explanation of the following editorial extract from Fairplay of London:

"One continues to hear of unwonted activity in American ship yards, and that there is more work offering than builders can overtake—or undertake. One 'prominent shipper' is reported to have said to an interviewer that his firm are badly in want of vessels, but that American ship builders have told them that they cannot consider any specification where delivery of the ship is required under two years. Therefore this patriotic though 'prominent' ship owner is obliged to cast his eyes abroad. He says that it will be necessary to bring pressure to bear on congress to compel it to allow American ship owners to purchase their vessels abroad—'unless the number and capacity of American ship building plants is speedily increased.' Quite so. We all know the song. But this 'prominent shipper' is not remarkable for the prominence of his knowledge or candor. He is reported to have said: 'The International Navigation Co. in contracting some time ago for two steamers to be built on the Clyde announced its intention of building an equal number in American yards, but now because of inability to get delivery within reasonable time, they are obliged to go to the Clyde for the other two, although, as I understand it, a large portion of the material for these ships will be made in America.' Now, the fact is that it is several months since the Clydebank Co. booked the orders for four boats, ostensibly for the Red Star Line, which is a branch of the International company. These boats must now be pretty well advanced, but I am not aware of any material having yet arrived from America. The only sale of American ship-plates known to the market was one made by Messrs. Neilson Bros. a good many months ago. I am told that these plates never arrived, and perhaps the difference on them may be one of the numerous claims by ship builders on this firm. That apart, however, I would call the attention of the 'prominent shipper' and others to the significant fact that orders have been placed in Glasgow quite recently for considerable quantities of steel ship plates and other ship building material for shipment to the United States. It is many a year since such a thing happened, but meanwhile, what does it imply? Certainly not that Americans are going to build ships in our yards of their own stuff."

When the paragraph referred to by Fairplay was written in this country, prices of material were nothing like what they are at present. Ship plate has more than doubled in price within a few months. At the low figures there was every prospect of our steel manufacturers developing a large foreign trade in ship material, even in England and Scotland. But the demand at home has not only shut off all effort in the direction of foreign trade, but has placed the manufacturers in the position of being unable to undertake new orders at home for delivery within several months at any price. The statement that this country will ever again be dependent upon England for anything of the steel kind like ship plates or shapes is not worthy of serious consideration. Our present prices in steel and iron have been brought on by abnormal conditions. Upon a return to reasonable prices, which will come a little later on, our steel manufacturers will again be pushing out for foreign trade not only in the ship yards but in a great many other similar lines.

YACHTING WRINKLES.

It would be difficult to find on the eve of another international race for the America's cup, a more interesting volume than "Yachting Wrinkles," which has just come from the pen of Capt. A. J. Kenealy. Capt. Kenealy, a recognized authority upon yachting, is the author of many books relative to the sport, including the well-known "Yacht Races for the America's Cup," but none of them surpass in interest this latest contribution, which may be described as a practical and historical handbook of valuable information for racing and cruising yachtsmen. The author frankly, but we may add needlessly, warns off literary critics with an explanation that he is simply an old sailor who went to sea when he was thirteen. For comprehensiveness of contents the volume is literally a marvel. Taking up first yacht racing as a sport, it gives a brief review from the inception of the pastime to the present. Then the material, construction and selection of a racing yacht is discussed, along with a consideration of the types—keel, centerboard and bulb-fin. Hints relative to going into commission and making the craft fit for a race are followed by a chapter on "Duty and Discipline Afloat," which is full of excellent advice. Noteworthy examples of the sea-jocky's art are entertainingly set forth and there is a resume of yachting rules and rules of the road. Etiquette in yachting, a kindred subject, is handled at some length, and the evolution of the racer and the cost of yachting bring up subjects which are of universal interest. Finally there are a number of hints to tars who wish to sail their own craft. The book is illustrated by more than a hundred diagrams, drawings and handsome half-tone engravings. The various subjects are grouped and classified with fine discrimination and the book is certain to hold the interest of every yachtsman, professional or amateur, and will moreover prove decidedly entertaining to the "land lubber" whose enthusiasm for the sport is only superficial.

"Yachting Wrinkles" is published by the Outing Publishing Co. of New York, from whom it may be purchased for $1.50.

Included among new vessels in the July supplement of the Inland Lloyd's Register are the following: Side-wheel steamer Pennsylvania, owned by Erie and Buffalo Steamboat Co., valued at $100,000 and rated A1; steamer Globe (rebuilt and lengthened), Bessemer Steamship Co. of Cleveland, $220,000, A1; steel barge Manila, Minnesota Steamship Co., Cleveland, $175,000, A1; wooden barge Santiago, James Davidson, West Bay City, $95,000, A1*; steel barge John Smeaton, Bessemer Steamship Co., Cleveland, $175,000, A1.

Low Rates to Pacific coast points.—The Nickel Plate road sells excursion tickets at special low rates to San Francisco and all Pacific coast points. Through palace sleepers and superb dining car service via the Nickel Plate road. Ask agents. 78, July 24.

AMERICAN SHIP BUILDING TOOLS.

A SUBJECT OF ESPECIAL INTEREST JUST NOW IN ENGLAND—COMPETITION IN MACHINERY LINES BRINGS OUT ALL MANNER OF DISCUSSION REGARDING OUR WORKMEN.

The efficiency of American ship building tools is a topic of first importance in England just now. Discussion at the recent conference of the Institute of Civil Engineers in London was largely along this line, and the announcement that a consignment of pneumatic tools manufactured by the Chicago Pneumatic Tool Co. is now en route to the Clyde, accompanied by a corps of American workmen who go to instruct the workmen of the Clyde yards in their use, has added interest to the subject.

Sir E. J. Reed, taking part in the discussion at the conference, commended the good work being done in the United States by pneumatic riveters and spoke also of the intelligent use of such tools, even by the colored workmen at the Newport News ship yard. In the discussion regarding machine tools, Mr. John Platt, of the firm of Thorpe, Platt & Co., American representatives of the manufacturers of Thornycroft boilers, took part as did also Mr. Warner of the firm of Warner & Swasey of Cleveland. Mr. Warner said that no such distinction between Americans, Englishmen and Germans was made in the United States as had been conveyed by discussion of the subject, and he cited numerous instances where Englishmen held foremanships in American tool manufacturing plants. He refuted the charge that American tools will not last. Mr. Platt testified to the accuracy of American tools and emphasized the fact that it was attention to detail which enabled the manufacturers of the States to turn out tools cheaply and well. Some idea of the trend of British sentiment regarding American tools and workmen is conveyed by the following extracts from a leading editorial in the current issue of the Engineer:

"It was stated during the recent conference that a machine-riveting plant as used in Newport News in the United States will save 50 per cent in labor. This means that one man will do the work done by two men now. Experimental plant of the kind is now on its way, we understand, to the Clyde. If it answers expectations the union will be asked to say what action it proposes to take. We shall not be surprised if the men refuse to have it. Such a policy will, of course, in the long run be suicidal; and, in any case, the machinery will take its place in our ship yards, on its merits, just as all other machinery—such as the power loom and the boot-making machines—come to stay. But the question which presents itself as most pressing at this moment is not the future of any machine, or system of construction, but—why should the working engineer in the United States be so different from the working engineer in this country? The curious thing is that the English and Scotch element is very strong in United States shops. It is a very great mistake to assume that American labor-saving machines are the invention of American brains only. English head workmen are common in American shops, and they will do there with the greatest cheerfulness that which they would not do in this country at all. There must not only be a reason for all this, but a reason that can be ascertained. Our readers may take our word for it, that it is a matter of clearly increasing importance to ascertain why it is that a workman in the United States will do almost twice as much as he will do in this country. Nobody thinks of putting this question. The English workman will tell you that it is because the American is 'hustled' by nigger-driving foremen. That, our readers may take our word for it, is not the case. The American works cheerfully. Is it the climate? Is it the food? Is it the social habits and life of the people? The sooner English employers address themselves to finding an answer, and, if possible, introducing the changes which are necessary to augment the turnout of the English workman until it equals that of the American artisan, the better. In that way, and in that only, can salvation be found."

TOLEDO HARBOR—VERY LARGE BOULDER.

Toledo, O., July 5, (Spl. Cor.) On Monday last the United States dredge Maumee removed from the river just above the Lake Shore bridge a boulder weighing about fourteen tons. It is a "granite niggerhead," nearly spherical in shape and about 7 feet in diameter. This is the rock upon which the steamer S. C. Reynolds was seriously damaged last season, and which was buoyed under the direction of the United States engineer office having charge of this district. The boulder was rolled toward the dock and by careful work was poised upon the dipper until it came in sight above the water surface, when it was securely chained to the dipper bail and the whole supported on a scow. The dredge and scow towed to the Craig's ship yard, where the boulder now rests in peace as a part of the regular wharfage.

The dredge Maumee has been engaged since May 4 enlarging and deepening the channel in the Maumee river under the new project authorizing a width of 400 feet and a depth of 21 feet at mean level. Work was begun in the vicinity of Buffalo street, where the greatest trouble has been experienced recently, and is now progressing up the river toward the Pennsylvania railroad bridge. The intention is that the United States dredge shall complete the work in the river above the Wheeling & Lake Erie railroad bridge and with the continuous contract authorized by congress, shall cover the remainder of the channel from the Wheeling & Lake Erie railroad bridge, through the bay to the lake. For this latter work proposals were opened on June 30, but the contract has not yet been executed. It is supposed the entire work will consume from four to five working seasons. The channel through Maumee bay and river is found to be in excellent condition considering the old project authorizes but 17 feet depth. In no place is the depth so small as 17 feet and nearly everywhere there is a middle depth of 18 feet or better. Considering the fact that water level fluctuates very rapidly at Toledo harbor under the influence of strong winds, it must be understood that a depth of 17 feet at mean level is rapidly shortened during the prevalence of a strong westerly wind, the water sometimes falling a foot in a very short time.

LIGHT LOSSES—OLWILL DISASTER.

Insurance companies have certainly been very fortunate on the great lakes this year. They never had a year when a grain fleet equal to that which spent last winter in Chicago got through to Buffalo with so little damage. It is early to talk about profits or losses in the insurance business for the season of 1899, but it would seem now that in view of premiums higher than have prevailed for a long time past, the insurance companies will certainly find a profit in the season's business, unless they encounter several very heavy total losses. The total losses since the opening of navigation would be of very little acount, if it were not for the number of lives lost, especially on the schooner Nelson, which foundered on Lake Superior, and the little wooden steamer Margaret Olwill, lost on Lake Erie a few days ago.

The Olwill was not a new vessel and was not especially strong, but she was a far better craft than a great many others that engage in the same trade. Capt. Brown, who was lost with his wife, his boy and other relatives among the crew of the Olwill, was well known in the St. Clair river country that turns out so many lake masters. He was a brother of Capt. Wesley Brown of the steamer North Land. Like a great many other ship masters who were out in the storm in which the Olwill was lost, he probably had no thought of a June blow lasting for any great length of time. At another season of the year he would have put back to Kelley's island immediately after the blow came on. But his vessel had been on the short run between the islands and Cleveland carrying stone for several years and had never encountered such weather during the summer months. The blow in which the Olwill was lost was very severe. It is said that her rudder chains parted in turning her and while in the trough of the sea. It would probably have made little difference when once in the trough of the sea whether her rudder chains had parted or not. Then it was only a question of the power of the vessel. She undoubtedly lacked the power necessary to get out of the trough of the sea in such a storm. She was probably not overloaded. Her load of stone was shifted to one side by the great power of the waves dashing over her. She went over, the stone shifted with her, and she never came back. Such was undoubtedly the end of the Olwill, which was probably not worth $10,000 herself, but with the loss of which some eight or ten lives were also carried off. The fact that this vessel carried three passengers, all of whom were lost, should prompt the government inspectors to unusual vigilence in enforcing the law against carrying passengers on freight carriers. The inspectors are neglecting the most important duty entrusted to them when they do not follow up very closely all such violations of the law.

SAVING A SHIP BY COMPRESSED AIR.

Frank Richards, who recently contributed to the American Machinist an article on "Compressed Air to Save Ships," which was reproduced in the Review, has received an interesting letter on the subject from Mr. George W. Dickie, manager of the Union Iron Works, San Francisco. Mr. Dickie says in part:

"There is no doubt that all that you maintain in the article referred to can be accomplished, and especially so if ships are built with the idea of using ompressed air for such a purpose. I have long advocated the use of compressed air on board ships as a means of safety in case of damage to the outer skin. I would like to refer you, if you will take the trouble to look it up, to volume 19 of the 'Transactions of the American Society of Mechanical Engineers,' containing my paper on the 'Transmission of Power in Naval Vessels,' page 241, beginning at the bottom of the page and reading through page 242. In writing as I did in that paper, I had considerable experience to support me. The British ship Jessie Osborn, referred to on page 242, went ashore about three miles north of the heads of San Francisco bay, where the coast is bristling with sharp rocks, and where there is always a certain amount of sea on. Upon examination of this vessel, I came to the conclusion that there was only one possible way of getting her off, and that was by using compressed air under the hold deck. For this purpose we strengthened the hold deck by bracing; recaulked it so as to be sure that it was tight; installed a compressor on the deck of the vessel, with boiler, etc., and connected the discharge of the compressor to the deck opening into the lower hold below. The attempt was entirely successful, and although a large portion of the bottom of this vessel was literally gone (openings in it that you could drive a cart through) she was successfully floated out amongst these rocks, several new holes being pierced in the bottom while pulling her out. We could raise and lower this vessel as we pleased after we got her into deep water by simply letting off or pumping air in, and she was kept afloat by this air cushion until such time as the dock was ready to receive her. So that you see this question of the use of compressed air is not a new one to me, and I can therefore fully endorse all that you maintain in your article. The Jessie Osborn was saved just nineteen years ago—in 1880."

The navy department announces a rearrangement of duties of the naval officials who are superintending the construction of vessels at Baltimore ship yards. Constructor W. H. Varney, inspector of torpedo boats, has been assigned to the additional duty of inspecting the construction of the dispatch boat building at the yard of the R. M. Spedden Co. Commander John D. Ford has been assigned to inspect the construction of machinery for the torpedo boat Tingey at the Columbian Iron Works. Lieut. R. C. Redgrave will devote his time to the inspection of work on the torpedo boat destroyers at Sparrow's Point.

Archibald Denny of Denny Bros., well-known ship builders of Dumbarton, Scotland, has reached the Atlantic coast on his tour around the world. He is inspecting ship yards and has, during the past few weeks, visited the yards at New York, Philadelphia and Newport News. When Mr. Denny began his tour last November he went to Burmah, then he observed ship building methods on the Rangoon, Irrawaddy and Bramaputra rivers in India, at Melba and Sydney, Australia, and in Tasmania and New Zealand.

SPLICES, KNOTS AND BENDS.

FIRST PRINCIPLES OF THE ART OF ROPE SPLICING AND IN THE USE OF THE MARLINESPIKE.—KNOTS, BENDS AND HITCHES THAT ARE USEFUL.

However useful it may be to those immediately concerned, it cannot be said that the operation of splicing together two pieces of hemp rope is in itself particularly attractive or interesting, and it is more than possible that the reader will feel that his occupation, business, or profession is never likely to call for any knowledge of the art. Nevertheless, at some future time he may be brought unexpectedly face to face with an emergency where the ability to make a good durable splice or to tie a strong

Fig. 1—Using the Marlinespike.

reliable knot will come in very handy, so it may not be entirely waste of time for him to read on. Moreover, it is probable that among the thousands who read this magazine every month, there are many who are more or less interested in yachting and shipping, or are employed in workshops where rope splices and rope tackle are not altogether unknown; to such the writer feels that a few practical hints from one who knows about these things will be of real value.

To begin with, let us define the word "splicing." Splicing is the operation of joining two pieces of rope so as to obtain one continuous piece, with no appreciable increase of diameter at the splice. There are several kinds of splices, but the two principal ones are the short splice and the long splice; these will be described first. Among other forms is the eye splice; this, and a variety of knots, bends, and hitches, will be taken up afterwards.

The principle of all splicing consists of joining or "marrying," the strands, thinning them out, and tapering them, so that the diameter at the splice is the same or only slightly greater than that of the rope itself. In the long splice, no increase in diameter is allowed.

Until within comparatively recent years all ropes were made of vegetable fiber teased out and spun into suitable form either by hand or machinery; but since the introduction into the rope-manufacturing industry of iron, and particularly of mild steel, steel rope is rapidly superseding all other kinds, even for running gears. For many purposes, however, fiber ropes are still used and can never be replaced by steel ones; they are made for the most part of either hemp, manila, or coir (cocoanut husk fiber). First, the fibers are spun into yarns, then the yarns into strands, and finally the strands into rope. The methods of splicing described and illustrated here apply only to these fiber ropes.

The only instruments necessary for making a splice are a marlinespike and a knife. The former is made of either iron or hard wood, is from 12 to 14 inches long, and about 1 inch in diameter at the thick end, the other end being sharpened to a blunt point about as shown in Fig. 1; it is always operated by the right hand, while the left encircles the rope. After pushing the extreme point through between the strands to be separated, the thick end is placed against the body of the operator; then, using both hands, the rope is twisted so as to render the work of opening the strands comparatively easy.

To make a short splice: Unlay—that is, split open—the strands at the end of each rope for a distance about as shown in Fig. 2; this distance

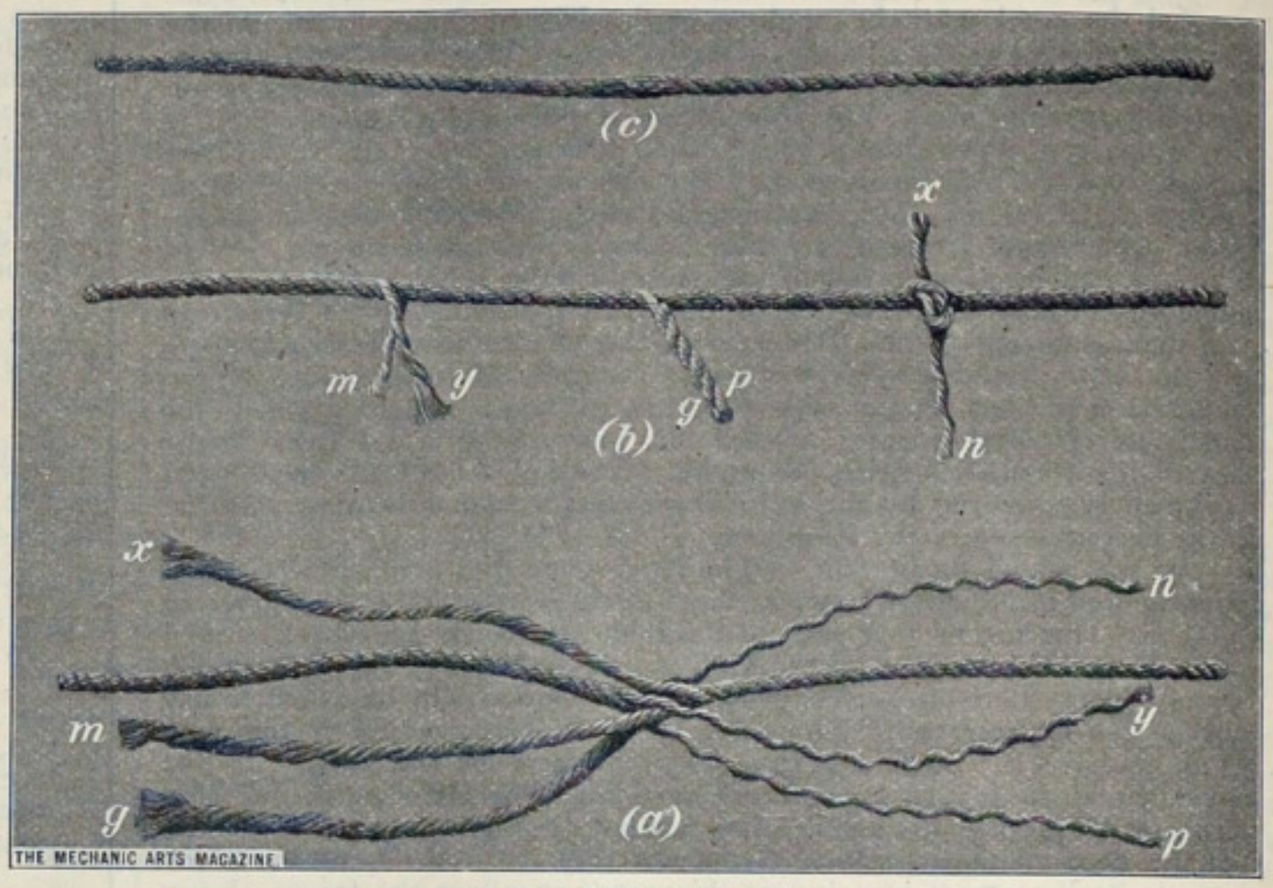

Fig. 3—The Long Splice.

depends entirely upon the diameter of the rope, but as the proportion will be the same for all diameters, the illustration serves as a general guide; be sure to unlay enough; a few inches too much is better than too little, as the ends have to be cut off anyway. Then, place the two ends together, as shown at (a), Fig. 2, so that each strand lies between two strands of the other rope. Now hold the strands x y z and the rope A in your left hand; if the ropes are too large to hold thus, fasten them together with twine; then take one of the strands, say n, pass it over strand y, and, having made an opening, either with the thumb or with a marlinespike, in the manner illustrated in Fig. 1, push this strand n through under x and pull it taut; this operation is known as "sticking." Proceed similarly with strands m and o, passing each over the immediately adjoining strand

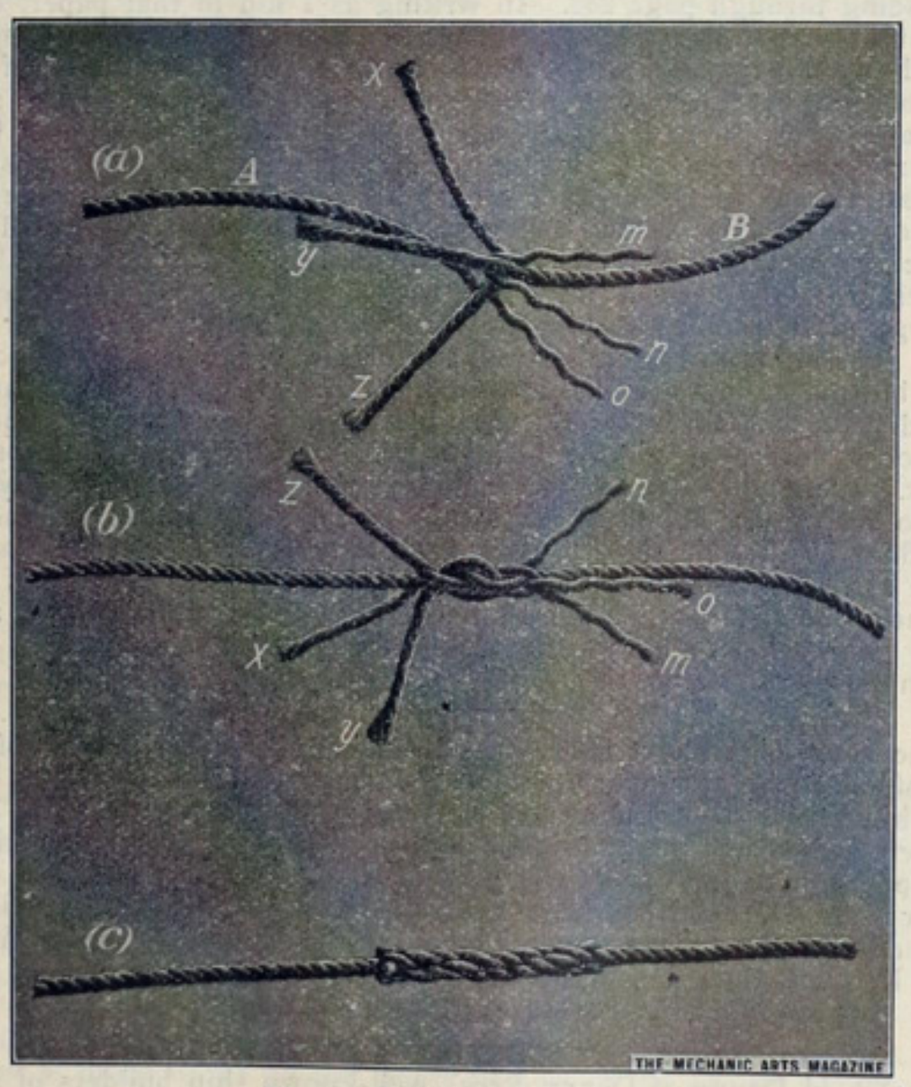

Fig. 2—The Short Splice.

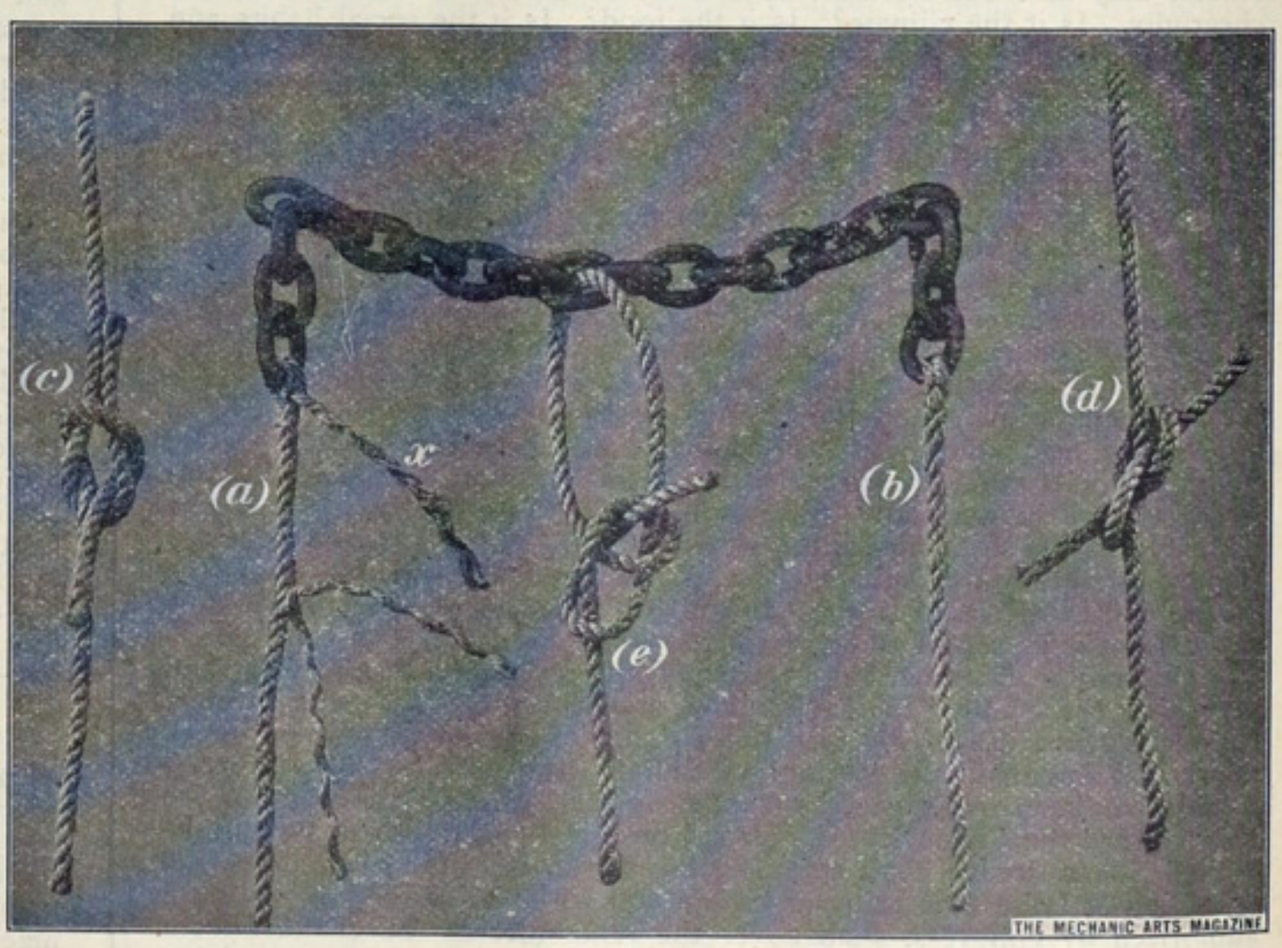

Fig. 4—The Overhand and the Bowline Knot, and a Useful Splice.

and under the next one. Perform precisely the same operation with the strands of the other rope, passing each strand over the adjoining one and under the next, thus making the splice appear as at (b), Fig. 2. Now in order to insure security and strength, this work must be repeated by passing each strand over the third and through the fourth, then, after subjecting the splice to a good stout pull, cut off the ends of the strands, and you have the finished splice as shown at (c), Fig. 2.

In slings and straps used for heavy work, the strands should be passed twice each way, and one-half of each strand should be "whipped," or bound, with twine to one-half of the rest, thus preventing the strands

from "creeping through" when the splice is taxed to the full capacity of the rope.

In the short splice, the diameter at the joint is rather greater than that of the rope, for which reason it is not a suitable splice where the rope is to be used in tackles and pulley blocks, or in places that will not admit anything larger than the rope itself. In such cases the long splice is used; this, when properly made, the untrained eye can hardly distinguish from the rest of the rope. To make the long splice: Unlay the ends as before, but about three times as far, and place them together, as shown at (a), Fig. 3, in the same manner as for the short splice. Then unlay one of the strands, say x of the right-hand rope, and in the groove thus made lay the strand n of the left-hand rope, taking good care to give this strand the proper twist, so that it falls gracefully into the groove previously occu-

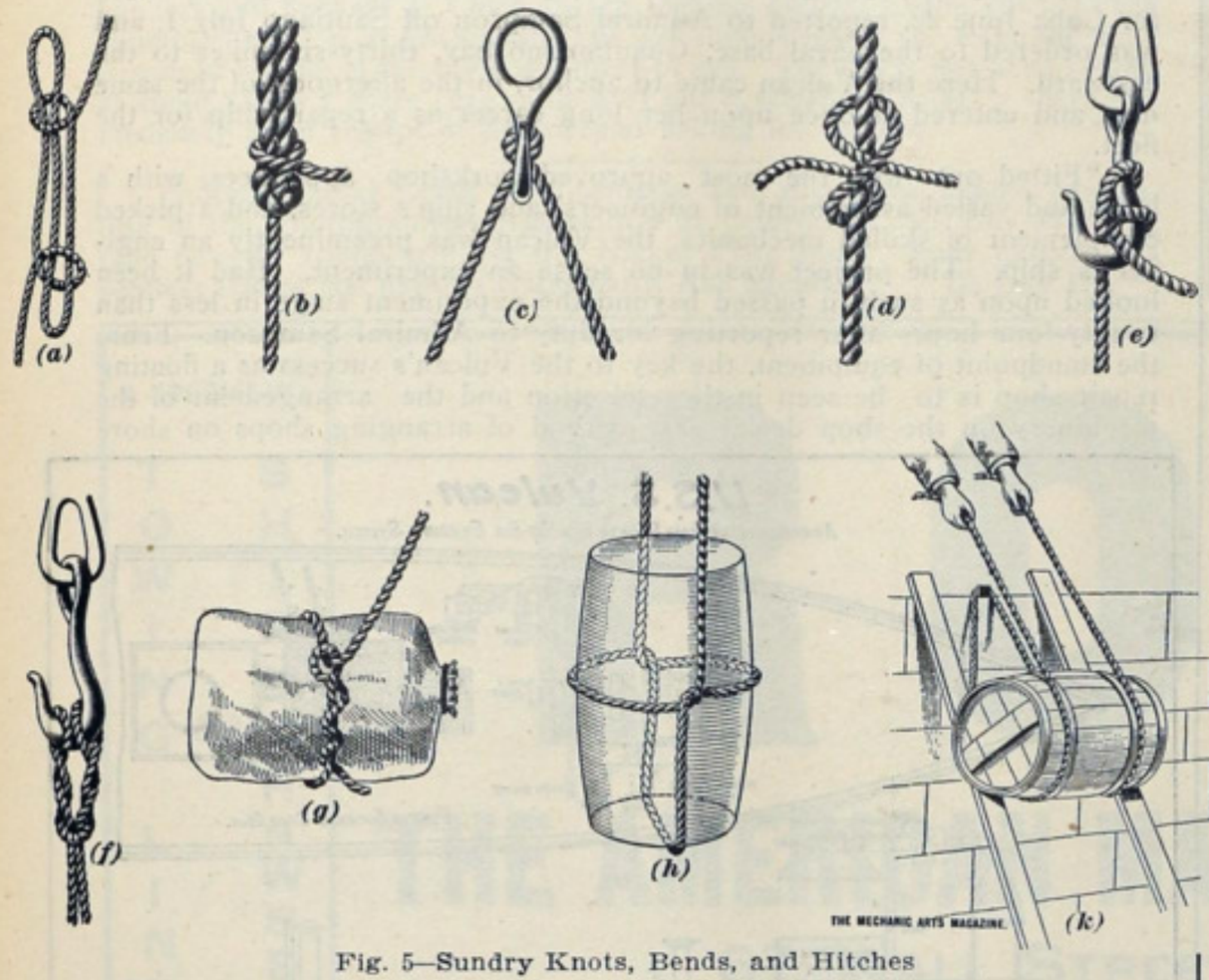

Fig. 5—Sundry Knots, Bends, and Hitches

pied by strand x. Do likewise with strands y and m, unlaying y gradually and in its place laying the strand m; the result is shown at (b), Fig. 3. Now, leaving the middle strands p and g in their original positions, cut off all the strands, as shown at (b); then relieve strands n and x of about one-third of their yarns, and with what is left cast an overhand knot as shown—exactly as shown; no other kind of knot will do. Pull this knot taut and dispose of the ends as in the short splice, by passing them over the adjoining strand and through under the next, cutting off a few yarns at each "stick." Proceed similarly with strands p and g, and y and m. The splice, when it is completed, appears as at (c), Fig. 3. Sometimes the overhand knot is made without first thinning the strands, and then split and the half strand put through as described, but by doing so, the surface of the splice is never as smooth as by the other method, which, for strength and neatness, is second to none.

A question frequently asked is how the splice compares with the rope in strength and durability; in other words, is the splice as strong as the rope that it joins? In the opinion of the writer, it is; the splice is quite as strong and durable as the rope itself. This is proved by the fact that on shipboard it is very rarely one hears of a rope or sling snapping in the splice. When such a thing does occur it is generally easy to trace the origin of the splice to some "greenhorn" of a sailor, or, if on a steamer, to some member of the engine department who parted with his teacher in rope splicing a little too soon. However, the theoretical version of the matter is that the splice is about one-eighth weaker than the rope itself; this is on the safe side, and makes allowance for indifferent work.

Another splice, and one that is as common and useful as the two already described, is the eye splice, illustrated in Fig. 6. To begin this, unlay the end of the rope about as far as for the short splice, and bend into the required size of eye, as shown at (a). Then tuck the end of the middle strand y under one of the strands of the standing part—having previously made the necessary opening with the marlinespike—and pull tight, getting what is shown at (b). Now push the strand x from behind, and under the strand on the standing part next above that under which the middle strand y was passed, so that it will come out where y went in, getting what is shown at (c); then pass the third strand z under the remaining free strand in the standing part, next to the one under which y was passed, getting (d). Now pull the strands taut, and from each cut out one-third of the yarns; pass each one over the adjoining strand and then through under the next, as in the short splice; then cut out one-half of the yarns, and tuck each one under its corresponding strand for the third time; give it a good stretching, cut off the ends, and thus complete the splice as shown at (e).

These three splices, the short, the long, and the eye, may justly be termed the ABC of the art, for if they are once thoroughly mastered the making of others becomes of little difficulty, since all other forms and varieties are in general but modifications or applications of them.

In Fig. 4, (a) and (b) show how to splice a small rope to a chain. To make this splice: Unlay the strands of the rope and reeve two of them through the end link; then unlay the third strand for about the distance shown, and in its place lay one of the other strands, the same as in making the long splice; make an overhand knot and dispose of the ends in the usual way; dispose of the third strand x—one of the two reeved through the link—as when making the eye splice, by "sticking" near the link; cut off the ends, and the splice is complete as shown at (b), Fig. 4. This is a very neat and strong splice, and can be used with advantage in connection with chains that are "tailed," or lengthened, with a rope that has to pass through sheaves or places that do not allow any increase of diameter in the rope.

Having made the reader acquainted with the principal splices in existence, it will, perhaps, not be out of the way to add a few words about the making of sundry bends and hitches connected with the handling of cordage. Among landsmen in general and persons not familiar with the use of ropes, the ignorance displayed in this direction is astonishing, there being very few indeed who know even how to knot two pieces of rope together properly. Nine persons out of ten will make the knot at (d), Fig. 4. And why? Simply because of that everlasting human instinct to commit error, by which we are all affected more or less. Such a knot hardly amounts to anything, as the least pull will cause it to slip. At (c), in the same illustration, the correct way to make the knot is shown.

Another error is indicated at b in Fig. 7; this is frequently committed by amateur yachtsmen when belaying or securing a rope—say the sheet of a sail—to a cleat. If, during a cruise, the boat is caught in a sudden squall that demands the immediate slacking up of the sheet, the result of this method of fastening it is more likely than not to prove fatal to the occupants of the boat, by causing immediate capsizing. As will at once be understood by a glance at the illustration, the increased strain on the sheet in such a case will jam the rope and render it impossible to ease off the sheet. Of the many cases of boats capsizing, most are due to this way of belaying the sheet. At a, Fig. 7, is shown the correct way to secure the rope.

A very useful knot that should be mastered by every mechanic and by all persons in any way connected with shipping is shown at (e), Fig. 4; by seamen this is known as the bowline knot. To make it, take the end of the rope in the right hand and the standing part in the left, and lay the end over the standing part. Then, with the left hand, turn over the end a bight (a loop, or turn) in the standing part, pass the end over and around the standing part, and through the bight again, thus completing the knot; all this is shown with perfect clearness in the illustration.

As an example of the many uses to which in emergencies the bowline knot can be applied, the following report found in the news columns of one of the New York dailies will perhaps be interesting: "At about half-past four o'clock this morning a patrolman on duty near pier No. 15, East River, was attracted by distressing cries for help that apparently came from the water-front. He hastened toward the end of the pier, and through the haze overhanging the water made out a human being struggling against the tide, which was slowly carrying him down toward the bay. The officer, quickly realizing that the drowning man was too far from the pier to be reached by an ordinary boathook, jumped down to the deck of a lighter that lay alongside the pier and getting hold of a rope made in the end of it a bowline knot large enough to admit the body of a man; this he threw out to the nearly exhausted struggler, shouting to him not to try to hold on to the rope but to get the loop over his head and under both his arms. The man finally succeeded in doing this, the line being paid out as he drifted away, and the officer, feeling that the rope had a good hold, began to haul in, and with the assistance of a brother officer who had responded to his call, the drowning man, now almost unconsious, was lifted on to the deck of the lighter. Here he soon revived and was able to give his name and also the name of the vessel from which he

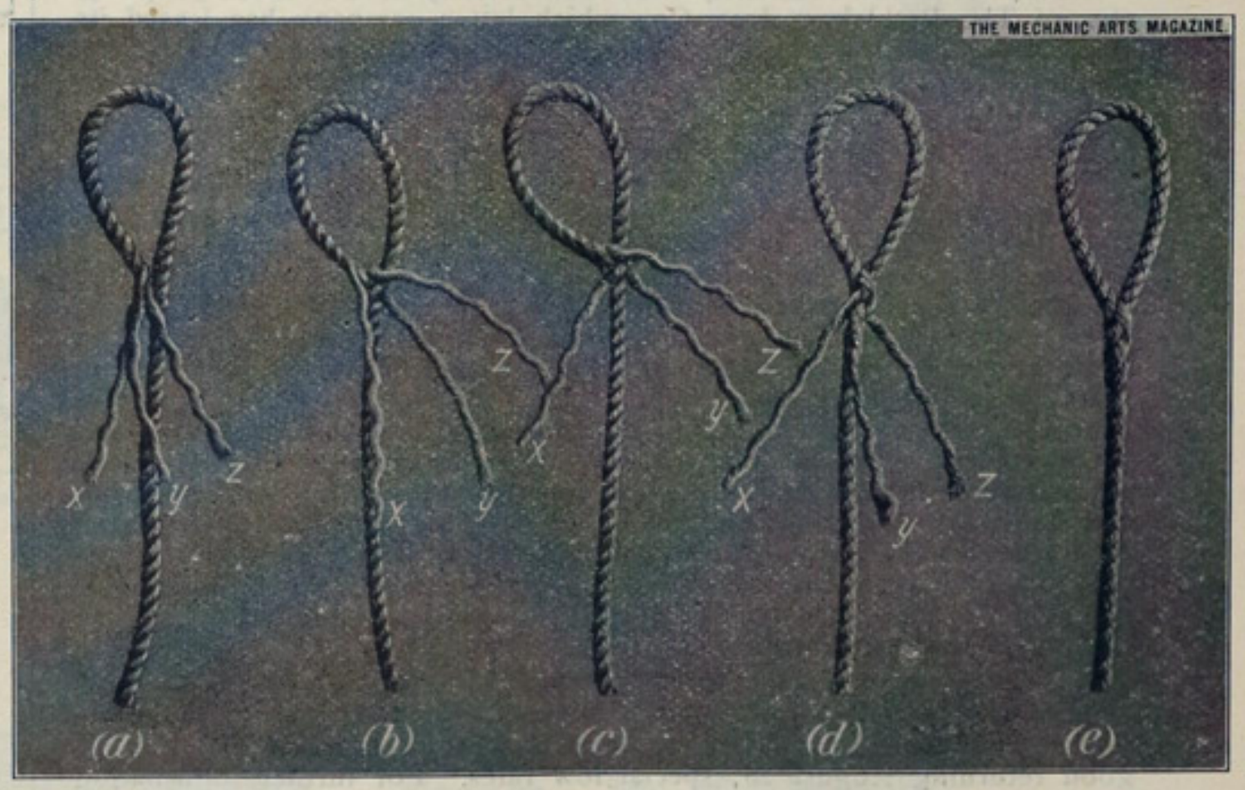

Fig. 6—The Eye Splice.

fell into the river. The policeman attributed the saving of this man's life solely to the bowline knot, as the man was too weak to have held on with his hands until the deck had been reached."

In Fig. 5 are illustrated a few methods of applying slings and ropes to hooks, barrels, etc., and a few other wrinkles useful to those engaged in workshops. Should a rope be too long for some temporary purpose, do not cut it, but arrange it as at (a); if several bights are laid up to shorten the rope to the required length, pass the standing part through and over the ends of all, and pull tight. At (c) is shown how a sling or strap should be applied to a hook when the rope spreads away to its load; this hitch prevents the sling from slipping in the hook in case the load comes in contact with some obstruction while being hoisted. At (b) and (d) is shown how a smaller rope should be secured to one of greater diam-

eter. The Blackwall hitch is illustrated at (e); except for very light loads, this should be made with the end twice around the hook (called a double hitch), as in the figure; experience has proved that this is the safest way, since with only one turn, the end is liable to "creep" when subjected to a heavy pull, especially in damp weather, when the moisture absorbed by the rope serves as a lubricant. When a rope is too long to conveniently secure its end to a tackle, a bight of it twisted as at (f) is very handy and useful; to make this hitch, commonly called a cat's paw, take hold of the

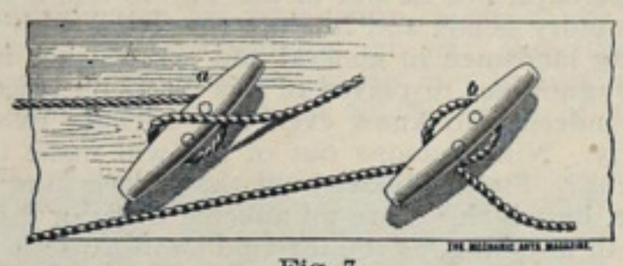

Fig. 7.

rope with both hands at places about two feet apart and twist it two or three times either way; then apply the ends of the loops thus made to the hook; the twisting prevents the rope from becoming jammed, and the hitch is very easily undone. At (g) is shown a timber hitch, so simple that explanations are unnecessary. At (h) is shown how to apply a rope to a barrel or similar vessel when, for some reason or other, it is desired to hoist it in a vertical position. At (k) is shown what is known as a parbuckle; this hitch is used for raising a heavy cask or similar load with a single length of rope. The illustrations that are here given explain the last two hitches much better than can be done in words.—Ernest K. Roden in Mechanic Arts Magazine.

TRADE NOTES.

"We furnish anything with rubber in it," is the characteristic announcement in a booklet received from Geo. W. Knowlton of Boston, dealer in mechanical rubber goods, who has recently established a new place of business at 71 & 73 Broad street.

"Graphite," the little publication gotten out by the Joseph Dixon Crucible Co., is certainly an advertising gem. It improves with each succeeding number and there is just enough in it to cause it to be read to a finish. The July number pictures lead pencils as sticks for skyrockets and as partners for firecrackers in a waltz over the celebration of the Fourth.

A very neat specimen of printing, selected with rare taste, announces that the seamless steel tubing and general welding business of the Standard Tool Co. has been transferred to a new company to be known as the Standard Welding Co., with manufactory and offices at practically the same place as that of The Standard Tool Co.; Central avenue and Cone street, Cleveland.

Alike to nearly every other manufacturing concern in the country, the Falls Hollow Staybolt Co. of Cuyahoga Falls, O., reports a very heavy business in safety hollow staybolt iron. Among orders in hand just now is one for two car loads of this iron for the Harlan & Hollingsworth Co., ship builders of Wilmington, Del. The Falls company is now selling to leading ship builders, boiler manufacturers and railroad companies all over the country.

On June 26 the Bethlehem Steel Co. formally took over the property, etc., of The Bethlehem Iron Co., which latter company has leased its works, etc., to the former company. Officers of the Bethlehem Steel Co. are: Robert P. Linderman, president; Edward M. McIlvain, vice-president; Abraham S. Schropp, secretary; C. O. Brunner, treasurer; R. W. Davenport, general superintendent; Owen F. Leibert, chief engineer; Charles P. Coleman, purchasing agent.

The Chicago & Aurora Smelting & Refining Co., with works at Chicago and Aurora, Ills., and Leadville, Col., have been merged into the American Smelting & Refining Co., which owns the principal large smelters of the country, having abandoned the manufacture of Babbitt metal excepting the filling of a few orders on hand, although they had made a specialty of the manufacture of this material for engines, rolling mills, etc., in the past two years. Mr. C. H. Reeves, Jr., who was in charge of this department, has therefore resigned his former position and becomes identified with Merchant & Co., Inc., of Philadelphia, New York and Chicago. Merchant & Co., Inc., have been operating large smelting works for a long period of years in Philadelphia and have always been very active in the manufacture of Babbitt metals. They are now in position to supply the former customers of the Chicago & Aurora Smelting & Refining Co. identically with all the Aurora grades of Babbitt metal they have been accustomed to use.

Chautauqua lake excursion.—The Nickel Plate road will run excursions to Lake Chautauqua July 7, good returning August 8; and July 28, good returning August 29; special low rates. For further information see agents. 70 July 7.

OPEN.

"KEYSTONE" OPEN LINK.
IT IS THE ONLY OPEN LINK ON THE MARKET THAT IS
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For STRENGTH, DURABILITY and SIMPLICITY
IT STANDS WITHOUT A RIVAL
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KEPT IN STOCK
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SEND FOR CATALOGUE AND DISCOUNTS
SPECIAL FORGINGS TO ORDER.
KEYSTONE DROP FORGE CO.,
19th & Clearfield Sts. PHILADELPHIA, PA.

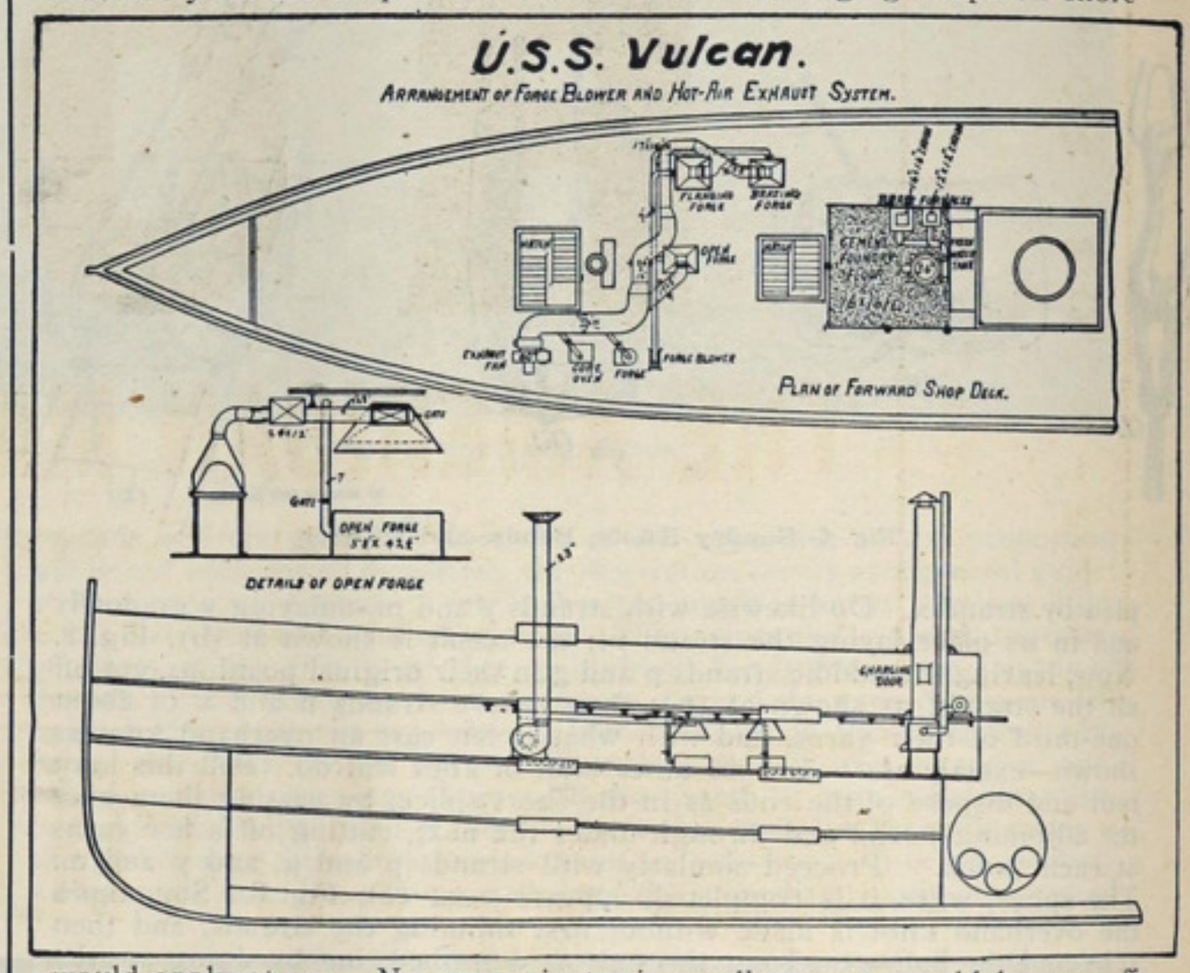
CLOSED.

A FLOATING MACHINE SHOP.

One of the novel features of the Spanish-American war was the repair ship Vulcan, of which Chief Engineer Simms and Passed-Assistant Engineer Aldrich have told an interesting story in the June issue of the Engineering Magazine from which we quote:

"Before the late war the engineer-in-chief of the navy, Rear Admiral George W. Melville, brought to the attention of the secretary of the navy the desirability of making such preparation for the fitting out of a vessel which would be a floating repair shop as would enable the work to be done with great rapidity when needed. Scarcely had war been declared when active preparations were made to carry out this recommendation. The steamship Chatham of the Merchants' & Miners' Transportation Co. was purchased by the government, sent to the Boston navy yard, overhauled, fitted out, renamed Vulcan, placed in commission May 22, sailed for Cuba June 22, reported to Admiral Sampson off Santiago July 1, and was ordered to the naval base, Guantanamo bay, thirty-six miles to the eastward. Here the Vulcan came to anchor, in the afternoon of the same day, and entered at once upon her long career as a repair ship for the fleet.

"Fitted out with the most approved workshop appliances, with a large and varied assortment of engineers' and ship's stores, and a picked complement of skilled mechanics, the Vulcan was preeminently an engineer's ship. The project was in no sense an experiment. Had it been looked upon as such, it passed beyond the experiment stage in less than twenty-four hours after reporting for duty to Admiral Sampson. From the standpoint of equipment, the key to the Vulcan's success as a floating repair shop is to be seen in the selection and the arrangement of the machinery on the shop deck. No method of arranging shops on shore



would apply at sea. No convenient wings, ells or tees could be run off from a central shop system. No gallery plan could be adopted. The fore-and-aft arrangement of everything was necessitated by the rigid requirements of having all work on deck, as near the water's edge as possible, facilitating receipt, execution and discharge of work, with convenience of supervision, giving ready command of the whole work of the shops.

"The installation of the forge blower and hot-air exhaust system is shown in the engraving printed herewith. The former was a 'Monogram' Sturtevant blower, with 7 inch discharge driven from the forward line of shafting, and the latter was equipped with a standard Sturtevant exhaust fan, with 23 inch discharge, and driven by a 3 by 4½ inch engine. New England mechanics, working nine hours a day, 'tween decks, off the south coast of Cuba, in mid-summer, required all the fresh water and air they could get. The next best thing to the forced circulation of fresh air was to have all the foul air and smoke from the forge fires exhausted, and this arrangement proved of inestimable value."

This type of installation, whereby the smoke is positively removed from the forges, has already been applied on land by the B. F. Sturtevant Co. Its success under these conditions led to its adoption on board the Vulcan, where it more than fulfilled the expectations.

JAMES McKAY & CO.
Manufacturers of all kinds of
High Grade Boom, Rafting, Toggle, Marine and Swedish IRON CHAINS.

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WANTED—Good hull with 30 horse power or more marine boiler. Will rent for a few months to test new engine. Port of Chicago preferred. Address Seymour-Anguish Engine Co., 4800 N. Clark street, Chicago. July 6

Mr. E. P. Gould, representing the marine department of the Dearborn Drug & Chemical Co. of Chicago, one of the largest manufacturers of boiler compounds in the country, announces the following list of agents on the great lakes: Alpena, C. B. Warren; Ashtabula, Harbor Ship Chandlery Co.; Buffalo, Howard H. Baker & Co. and C. H. McCutcheon; Bay City, John Styninger; Chicago, H. Channon Co.; Cleveland, John Thomson, Upson-Walton Co. and W. M. Pattison Supply Co.; Detroit, H. D. Edwards & Co. and John Ackerman; Escanaba, F. H. Atkins & Co.; Green Bay, A. Kimball; Lorain, N. C. Alten; Milwaukee, Joys Bros. & Co.; Manitowoc, Rand & Roemer; Ogdensburg, Nash Bros. & Co.; Oswego, John S. Parsons; Saginaw, Geo. A. Thrasher; South Chicago, South Chicago Ship Chandlery Co.; Sault Ste. Marie, Soo Hardware Co.; Toledo, M. I. Wilcox Co.

Nobody in iron mining circles seems to know why J. B. Breece & Co., bankers and brokers of Chicago, are seeking options of the stock of the Republic Iron Co. at $20 a share, but it is supposed that the Republic mine is sought by one of the big consumers of ore. The stock had been selling at about $13.50 a share (par value $25) but it advanced to $17 a share immediately upon receipt of the circular asking for options.

Photographers! Bring your cameras and attend the annual convention of the Photographers Association at Celeron, N. Y., July 17 to 22. One fare for round trip via the Nickel Plate road. Your choice of a peerless trio of fast express trains daily. Ask agents. 72, July 17.

The Armstrong Manufacturing Co. of Bridgeport, Conn., has found its business increasing so rapidly that another addition to its plant is required, the second since Jan. 1. New machinery is being added and the company has built a large fire-proof warehouse for the shipping department. The company reports an increase of 30 per cent in export business within the past few months. No less than $125,000 worth of pipe threading machines have been exported to Germany since Jan. 1. This amount is said to be greater than the entire production of Germany.

The Bullock Electric Mfg. Co. of Cincinnati, has issued a very appropriate calendar for the month of July. It is emblazoned in gold and the national colors, and presents in compact but artistic form a list of the vessels which took part in the battle of Santiago and the regiments which served at San Juan hill, El Caney, and the Siege of Santiago.

The Harlan & Hollingsworth Co., of Wilmington, Del., authorize the Review to correct the erroneous report that the engines for the steamers Ponce and San Juan, now under construction by them, are being built outside their yard. The Harlan & Hollingsworth Co. are building these engines in their entirety.

National Educational Association convention at Los Angeles, Cal., July 11 to 14. Go via the Nickel Plate road. A peerless trio of fast express trains daily. Unexcelled dining car service. Rates low. Ask agents. 45, July 6.

A SPECIALTY:
TOWING LINES AND SHIPS' HAWSERS

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THE LARGEST MANUFACTURERS OF FIBER IN THE WORLD.

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4-STRAND PLUMBAGO HEART
HOISTING ROPE
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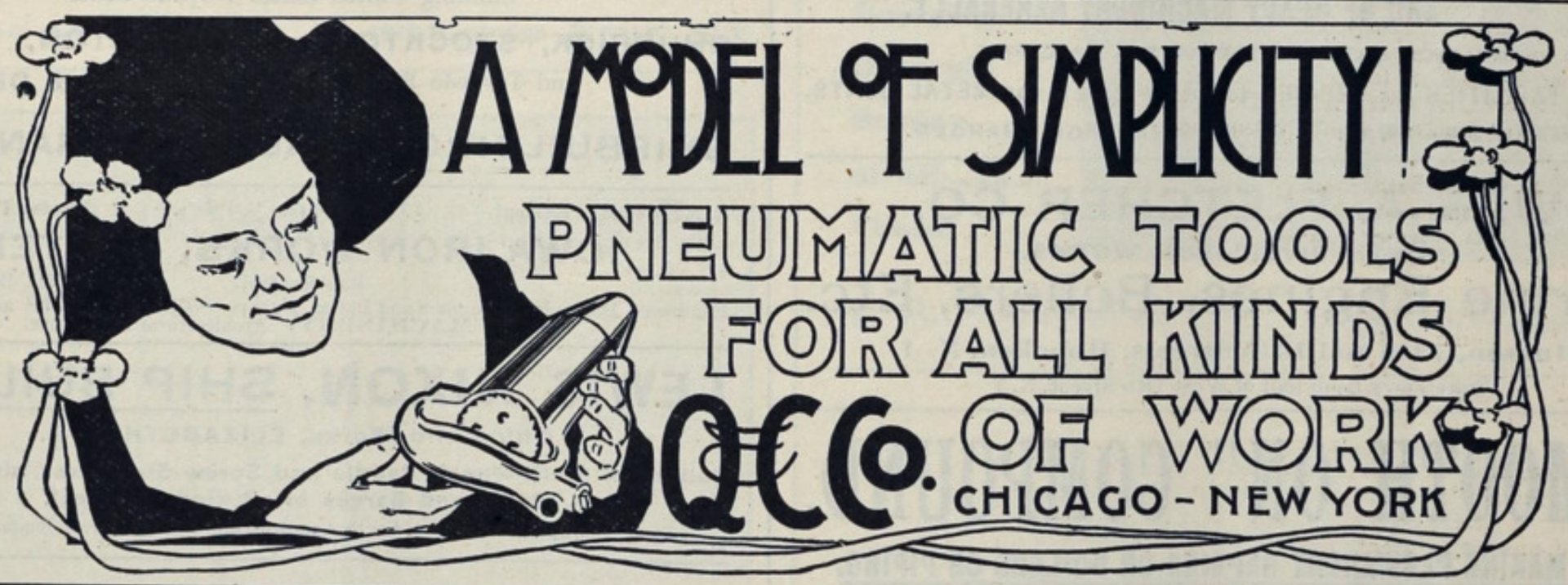

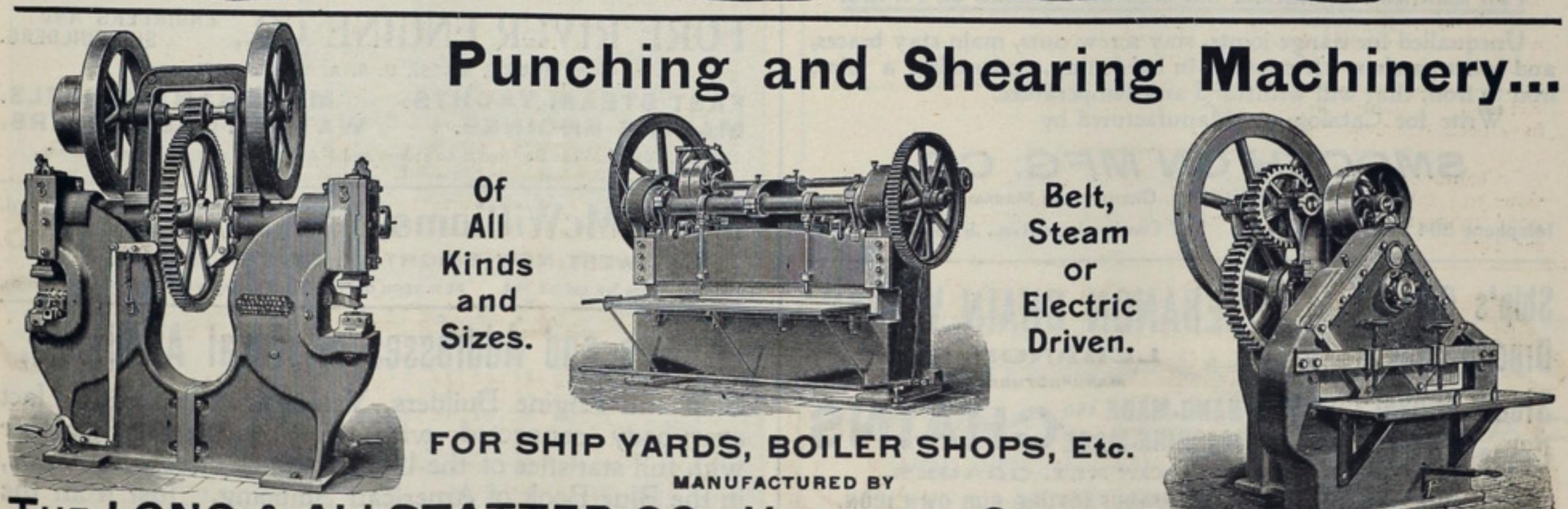
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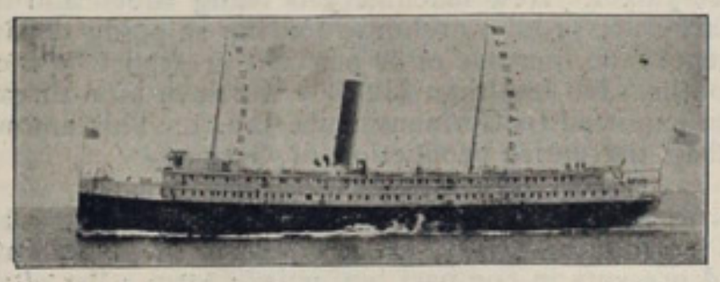

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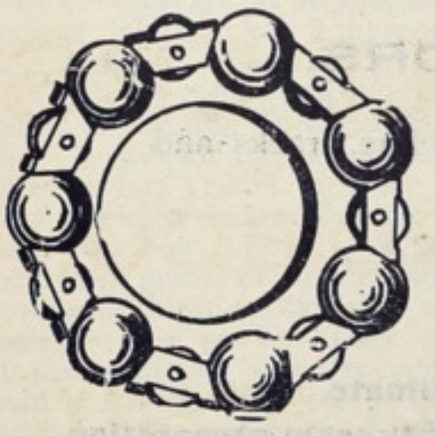

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30	31	..				

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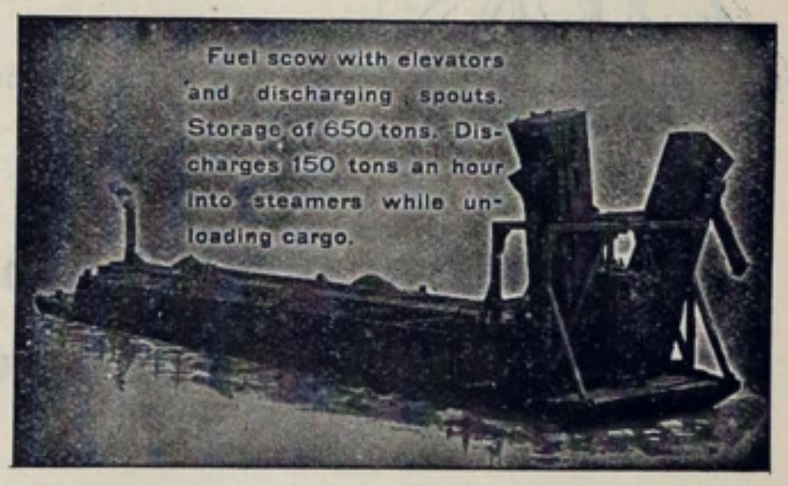
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M. A. HANNA & CO., Miners and Shippers. Main Office, Perry-Payne Bldg., Cleveland.

U. S. Engineer Office, Jones Building, Detroit, Mich., June 30, 1899. Sealed proposals for dredging at Cheboygan and Alpena harbors, and Saginaw, Sebewaing, and Belle Rivers, Mich., will be received here until 12 o'clock, noon (standard time) July 24, 1899, and then publicly opened. Information furnished on application.

G. J. LYDECKER, Lt. Col., Engrs.
July 20

U. S. Engineer Office, 57 Park St., Grand Rapids, Mich., July 5, 1899. Sealed proposals for repairing government pier at White Lake, Mich., will be received here until 3 p. m., July 20, 1899, and then publicly opened. Information furnished on application.

CHESTER HARDING, Capt., Engrs.
July 13

CHAUTAUQUA LAKE EXCURSION

—VIA THE—

NICKEL PLATE ROAD

Tickets will be available July 28, good returning until August 29,

AT SPECIAL LOW RATES.

Do not miss this opportunity of visiting this beautiful resort. A peerless trio of fast express trains daily. Palace sleeping cars. Superb dining car service. Elegant equipment. Ask agents. 71, July 28

Perfectly Tight Deck Seams Guaranteed

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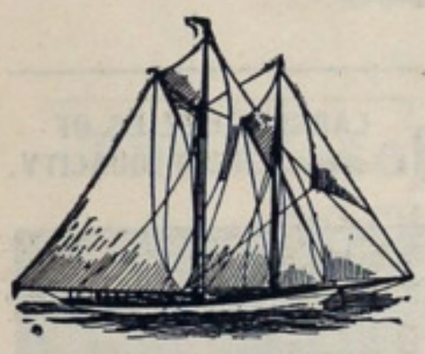

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First—That it will not crack, crumble or deteriorate in any climate.
Second—It is more tenacious, flexible and elastic than any other seam preparation.
Third—When seams are to be recaulked, the Elastic Composition can be removed without injury to the edge of deck planks.
Fourth—One pound of Elastic Seam Composition will fill as many running feet of seam as two pounds of best lead putty.

In order to have proper results, the Elastic Seam Composition must not be used without the Elastic Seam Paint.

Following are a few of the firms who have used our Elastic Seam Composition and Seam Paint:

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Wyandotte Pleasure Yacht Works, Wyandotte, Mich.
Wickes Bros., Saginaw, Mich.
Matthews & Co., Bascom, O.
Nelson Yacht Bldg. Co., Baltimore, Md.
Jos. Thomas & Son, Baltimore, Md.
S. W. Tilton & Son, Camden, N. J.
A. C. Brown & Son, Tottenville, N. Y.
Samuel Ayers & Son, Upper Nyack, N. Y.
T. M. Milton, Brewerton, N. Y.
C. C. Hantz, Yacht Designer, Quincy, Mass.
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J. W. Glenny, Rooms 7 and 8, Cotton Exchange Bldg., New Orleans, La.

(MENTION THIS PAPER.)